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THE

# MEDICAL JOURNAL OF AUSTRALIA

VOL. II.—11TH YEAR. SYDNEY: SATURDAY, OCTOBER 11, 1924. No. 15.


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## Table of Contents

ORIGINAL ARTICLES— PAGE.

"Gall Stones," by SIR GEORGE SYME, K.B.E., M.S., F.R.C.S. .. 365

"Flour Mills and Health," by D. M. MCWHAE, C.M.G., C.B.E., M.D., M.R.C.P. .. 369

"An Investigation into the Flour Milling Industry in Victoria," by WALTER SUMMONS, O.B.E., M.D., D.P.H. .. 370

"Cancer and Acquired Resistance to Tuberculosis," by THOMAS CHERRY, M.D., M.S. .. 372

REPORTS OF CASES—

"Progressive Muscular Atrophy," by ERNEST CHENOWETH," M.D. .. 378

REVIEWS—

Crime and Insanity .. 378

Dermatology .. 378

LEADING ARTICLES—

Public Health Efficiency .. 379

CURRENT COMMENT—

The Surgical Treatment of Diseases of the Stomach .. 380

Venous Pressure .. 381

ABSTRACTS FROM CURRENT MEDICAL LITERATURE— PAGE.

Pædiatrics .. 382

Orthopædic Surgery .. 383

BRITISH MEDICAL ASSOCIATION NEWS—

Medico-Political .. 384

Nominations and Elections .. 384

MEDICAL SOCIETIES—

The Medical Sciences Club of South Australia .. 384

The Melbourne Pædiatric Society .. 385

CORRESPONDENCE—

Peri-Bronchial Fibrosis .. 387

NAVAL AND MILITARY—

Appointments .. 387

REPATRIATION COMMISSION .. 388

NOTICE OF MEETING .. 388

MEDICAL APPOINTMENTS .. 388

MEDICAL APPOINTMENTS VACANT, ETC. .. 388

MEDICAL APPOINTMENTS: IMPORTANT NOTICE 388

DIARY FOR THE MONTH .. 388

EDITORIAL NOTICES .. 388

### GALL STONES.[1]

By SIR GEORGE SYME, K.B.E., M.S. (Melbourne), F.R.C.S. (England),

*Honorary Consulting Surgeon, Melbourne Hospital, Melbourne.*

MAY I express my great appreciation of the the honour you have done me in inviting me to address you? I realize that you cannot expect me to tell you anything new or even anything very interesting. I do not propose to deliver an address, much less an oration, but simply to relate some experiences. Jerome K. Jerome has observed somewhere that: "Experience is a book that all men write but no man reads—experience is untranslatable. Youth comes to teach, age remains to listen." I can only hope perhaps faintly to interest you in a subject in which I have myself been very interested for a long time, that of gall stones. I also select it because not only surgeons, like myself, but also general practitioners and physicians frequently meet with this affection in their ordinary practice.

In the year 1896 I wrote a paper on this subject in which I tried to emphasize the serious effects that gall stones produce, and especially the dangers of the inflammatory conditions that arise as the result of the continuance under palliative treatment or without treatment of gall stones, dangers that could have been averted by early operation. My theme tonight is much the same and as I did then, I propose to deal with it mainly by the recital of illustrative cases.

The first example is the case of Mrs. B.

In March, 1914, I operated on her and removed a large uterine fibro-myoma. The abdomen was thoroughly explored and no other abnormality was found. In November, 1918, she had recurrent attacks of abdominal pain, diagnosed as appendicitis, and the abdomen was again opened and an inflamed appendix removed. Two gall stones were also discovered in an almost normal gall bladder. Her condition was not very good and rather reluctantly we decided to leave them, informing the patient and her friends of their presence and advising that if she ever had any symptoms, the stones should be removed. In 1922 she did have symptoms, but as her husband had become very seriously ill, she said nothing about them. In January, 1924, however, she could no longer conceal them as she became very ill with pain, fever, rigors and jaundice. She agreed to operation at which we found the gall bladder inflamed and contracted round several large stones. It was very friable, tearing when separated. It was eventually removed with great difficulty. On ligating the vessels the ligatures cut through and a Moynihan's forceps was left on. A probe was passed down the common duct and a careful search made for further stone, but none was found. The forceps were removed on the fifth day. On the tenth day bile escaped and on the twelfth day she had a severe hæmorrhage, collapsed and died. Her

[1] Read at a meeting of the Queensland Branch of the British Medical Association on August 8, 1924.

husband died two days later, his end accelerated by the strain and shock of her operation and fatal ending.

This tragic case seems instructive from several points of view. It gives some indication of the time stones take to form and of the time in which, having formed, they may cause serious mischief. It is also a forcible illustration of the danger of not operating when stones are known to be present.

Just about the same time I had another case illustrating the same thing.

The patient was a retired nurse, aged sixty-six, who began to have abdominal pains in October, 1923, and then had an attack of pain with a rigor and vomiting. Her local medical attendant diagnosed gall stones and she also saw a physician in consultation who confirmed the diagnosis. She would not agree to operation because she had undergone an abdominal operation sixteen years previously, had nearly died after it and was for a long time afterwards mentally affected. Further she had suffered from high blood pressure for some years and had a systolic bruit at both the mitral and aortic areas. At the end of November, 1923, she became jaundiced, the jaundice persisted, but varied in degree. She also lost weight. I saw her on December 14, 1923, and made a diagnosis of gall stone in the common duct. The jaundice was considerable, but she had no tenderness and the gall bladder could not be palpated. She thought the jaundice was somewhat less and she still objected to operation. She wished to try some "patent cure" for gall stones, recommended by a friend. However, she did not improve, the jaundice increased. She lost weight and strength, was always nauseated and had no appetite. She had irregular rises of temperature, with occasional shivers and sweats and varying amount of pain. In February, 1924, she finally realized that she could not go on as she was and agreed to operation. This was performed on February 25, 1924. The gall bladder was contracted and densely adherent, the common duct was embedded in dense adhesions and contained a large stone which was removed. The gall bladder seemed empty and was left. There was free oozing of blood everywhere and she was greatly shocked. The oozing continued and she died the same day.

Why are operations on patients like these in whom infection and jaundice have occurred, so often fatal? I cannot tell you. It seems as if the occurrence of infection and jaundice causes changes in the liver cells and interferes with their metabolism, lessening in some way the patient's powers of resistance and recuperation and causing hæmorrhage which is very difficult to arrest. The lesson to be learned is that operation should be undertaken before such changes occur.

How then are we to recognize the presence of gall stones in their early stages? The diagnosis must ordinarily be made by the general practitioner who is consulted for what is generally called indigestion. The symptom of this is discomfort or pain. It generally occurs soon after eating, but does not, like the pain of duodenal ulcer, bear a definite relation to food, though it very often occurs about three-quarters of an hour after a meal or sooner. It is associated with flatulence and is often relieved by belching of wind. The flatulence is often brought on by vegetable foods such as cauliflower, cabbage and so forth. Nausea is common and sometimes vomiting occurs which also gives relief. The pain is very often behind the sternum, often in the epigastrium and not infrequently in the left side of the epigastrium. It may be definitely in the right sub-costal area. Pain may also be felt behind the right shoulder or between the scapulæ. It may run from the shoulder down the right arm. Moynihan says that if the discomfort is relieved by drinking hot water, it is almost certain to be due to gall stones, but I cannot corroborate this statement from personal observation. Sometimes patients complain of heartburn and sometimes they say that they get goose skin or slight shivers. On examination right sub-costal tenderness is usually found, especially with the patient sitting up and on taking a deep breath when the examining fingers are tucked under the costal margin. Tenderness may be epigastric, sometimes a tender spot can be found in the right axillary line over the seventh rib. With such a condition gall stones should always be suspected and the diagnosis verified by exclusion and by a complete and thorough investigation including that of the nervous system to exclude lesions of the spinal cord, such as *tabes dorsalis*. One lesson I have learned in my years of practice, is the necessity for thoroughness of examination. More mistakes are made from want of care than from want of knowledge. It is a wise precaution to examine the reflexes, examine the urine, examine the rectum and in married women to make a vaginal examination in every case. In addition the blood should be examined.

Mayo has observed that an area covered by the palm of the hand includes under it the gall bladder, bile ducts, duodenum, pylorus, right kidney and a high appendix. With the symptoms mentioned these organs are the ones mainly to be considered in differential diagnosis. The next steps to be taken are to have an X-ray photograph of the gall bladder and kidney taken, an X-ray screening done and a photograph of the stomach, duodenum and colon taken after the administration of a barium meal. The stomach contents should be examined after a test meal and the fæces should be examined for occult blood. Of course, the urine should be submitted to microscopical examination. An X-ray photograph of the gall bladder area will very frequently reveal definite shadows of gall stones when they are present and thus give a positive diagnosis. The following cases may be cited as of interest in this connexion.

Miss M., aged thirty-one years, was seen in consultation on March 23, 1922. Her story was that six years previously she had what was called a gastric attack in which she vomited every time she took food, no matter what its nature was. She recovered and was fairly well until December, 1921, when the vomiting recurred. It was of the same type, a portion of everything taken being rejected, occasionally with some bile. She had never had any pain or what she regarded as pain, but had had discomfort after food or what she called indigestion more or less for the previous six years. She was very constipated. On January 31, 1922, she was found to be tender in the right hypochondrium. An X-ray examination was made on February 2, 1922, and this disclosed only a good deal of pyloric spasm. On February 17, 1922, she had sharp pain in the left renal region, shooting towards the pubes. The urine contained blood and the next day pus and colon bacilli. Her temperature, hitherto normal, went to 38.9° C. (102° F.). She was still vomiting in spite of rest in a private hospital, dieting and medical treatment. On March 21, 1922, a further X-ray examination was made. This was mainly directed to the kidneys, but the film contained a number of shadows in the gall bladder area which the radiologist said were caused by facetted gall stones. In the urinary tracts no abnormality was dis-

covered. I regarded the case as one of gall stones with super-added colon infection of the left urinary tract and advised that this should be treated first. She was examined with a cystoscope, the bladder was found to be healthy and ureteral catheterization revealed a left pyelitis. The renal pelvis was irrigated and she was given vaccines. Under this treatment pyuria diminished and on July 25, 1922, I operated and found numerous facetted gall stones, exactly corresponding to the X-ray picture. She went home practically well on September 6, 1922.

Another patient, Mrs. S., was seen in consultation on April 16, 1924. Her condition was even more obscure. She had been under treatment for years by numerous practitioners. She said she was afraid to eat much because any food "made her stomach sour." She had aching in the left loin and occasional dry retching. She said her legs sometimes gave way and she had a throbbing pain in the left temple. She had never had jaundice or acute pain in the abdomen. On examination the abdomen seemed tender all over, but not especially over the gall bladder area. A test meal revealed a total acidity of sixty and the hydrochloric acid was twenty-five. At times the abdomen got distended with gas. Examination of the urine revealed no abnormality. An X-ray film revealed the gall bladder packed with calculi. I operated on June 5, 1924, and removed the gall bladder which was exactly like the X-ray photograph.

Even when a positive picture is not obtained, an X-ray examination will often give indirect evidence. The normal gall bladder is not rendered visible by X-ray examination and indefinite shadows in the gall bladder area are suggestive of thickening or other pathological conditions. Another indication is an alteration in the shape of the duodenum and in the position of its second part which may be directed laterally towards the liver; also changes in the position of the transverse colon may be found.

If the X-ray photograph and examination of the urine yield no results, renal calculus and renal disease may be excluded. Duodenal and pyloric ulcers are not so readily distinguished and even gastric carcinoma may be mistaken for gall stones. When I was in London in 1915, one of the house surgeons at the London Hospital asked me down to see his chief operate. The first patient on the table was said to have gall stones and had been referred for operation from the medical side. On operation a duodenal ulcer was found and no gall stones; gastro-jejunostomy was done. A week or so later I went again and the same surgeon was operating for supposed gall stones. He referred to the case I had seen on my previous visit and said that this time every possible investigation had been made and they were sure it was a case of gall stones. He operated, but again found duodenal ulcer and no gall stones.

In March, 1914, I saw in consultation a lady, aged thirty-two, who for three years had complained of pain in the epigastric region and occasional vomiting. Latterly the pain had been more in the right sub-costal area. She had never vomited blood nor had she been jaundiced. She had recently been travelling in Europe and had seen physicians in England and in Spain and had also seen two leading physicians in Melbourne. An X-ray examination revealed no abnormality. A sub-acidity was found on analysis of the gastric contents. She was tender in the right hypochondrium, but no tumour could be detected. Everyone who had seen her, had diagnosed gall stones. I operated and found a carcinoma of the lesser curvature of the stomach for which gastrectomy was successfully performed.

Nevertheless, usually the high acidity, the definite food relation of the pain—food, comfort, pain; food, comfort, pain—the pain being at least two hours after food, the presence of occult blood in the fæces and the appearances on X-ray examination serve to indicate duodenal ulcer. In any case operation is indicated and the diagnosis will then be cleared up. But when operating for supposed gall stones it is well to have the instruments ready to do gastro-enterostomy or gastrectomy. It must be borne in mind also that gall stones and duodenal ulcer may co-exist and even be associated with chronic appendicitis as well. I have more than once performed gastro-jejunostomy, cholecystectomy and appendicectomy at the one operation. I have seen several cases in which a gall stone in the gall bladder or in the common duct had ulcerated through into the duodenum and symptoms of duodenal ulcer were superimposed on and disguised those of gall stones. It must be remembered also that chronic appendicitis and gall stones are often present together, perhaps as cause and effect, infection extending from the appendix to the gall bladder and the infection of the gall bladder producing gall stones. The ætiology of gall stones is still a mystery, but infection seems to play an important part in their production. The experiments of Rosanov in this connexion are very remarkable, but require further confirmation.

Another association about which I next wish to speak, is that of gall stones with pancreatitis and glycosuria. If the recital does not weary you, I would like to illustrate this association by reading notes from actual cases.

Mrs. E.W., aged forty-two, was seen on June 12, 1919. Three days previously she had been seized with severe abdominal pain and vomiting. The pain was chiefly in the epigastrium, especially to the left of the middle line and shooting to the left shoulder. It was described as agonizing and was somewhat relieved by vomiting. She stated that her first attack of pain had occurred thirteen years previously. She had had many since, but more frequently in the previous year. In the intervals between attacks she suffered from fullness after meals and a dull pain in the pit of the stomach with flatulence and belching. She had never been jaundiced, but she said that her mother and her sister both suffered from somewhat similar attacks with jaundice. On examination she was flushed and no jaundice was perceptible. The temperature was 38.7° C. (101.6° F.) and the pulse rate was 112. The tongue was coated and brown. There was some rigidity of the abdomen which was tender all over, but especially in the right hypochondrium. The urine contained sugar and acetone, but no albumin. She was treated for the glycosuria by starvation and dieting. On June 19, 1919, the urine was sugar free, but a trace of acetone was present. By June 29, 1919, this had disappeared. Operation was performed on June 30, 1919. On opening the abdomen fat necrosis was found. The gall bladder was small, contracted and full of calculi. The common duct and also the cystic duct were stuffed with calculi. The pancreas was nodular, swollen, hard in places, softened and friable in others. The common duct was opened and the calculi removed, one was fixed in the ampulla of Vater. The stones were removed from the gall bladder and the cystic duct. The capsule and the pancreas were incised and a tube was put into it. Tubes were put into the common duct and the gall bladder. The patient was pretty bad for a few days, but gradually picked up. On August 3, 1919, she was discharged apparently well.

May I further tax your patience by narrating one more case?

Mrs. J., aged forty-nine years, was seen on March 11, 1919. She complained of abdominal pain, chiefly over the lower ribs on the right side and shooting to the right

shoulder. She had also frequent micturition and thirst. Fourteen days previously she had some pain followed by retching, shivers and sweating. Her husband said that she was yellow. She had had attacks of pain at intervals for years. On examination she had a slight icteric tinge of the conjunctivæ. She was tender below the right costal margin where a smooth rounded swelling was found moving with respiration. The urine had a specific gravity of 1040 and contained 3% sugar and also acetone. X-ray examination revealed no abnormality and the blood serum did not react to the Wassermann test. By starvation and dieting the urine was made sugar free by March 26, 1919, but acetone still remained. By regulating the carbohydrates of the diet the urine became free from acetone and sugar by April 3, 1919. Operation was performed on April 23, 1919. The gall bladder was found enlarged, adherent and inflamed, it contained calculi and so did the cystic duct. The common duct was dilated and contained stones in its lower end. The duodenum was displaced mesially, the common duct was isolated and opened and three stones were milked out from the lower end and from the ampulla of Vater. The gall bladder was then removed. The pancreas was swollen, nodular and hard. She gradually improved and was discharged on May 9, 1919, practically well and with the urine sugar free.

Since the discovery of "Insulin" of course, we treat such patients with it before submitting them to operation and can get their urine sugar free much sooner and more satisfactorily. Experiments on animals have shown that if the duct of Wirsung be obstructed, pancreatitis occurs and that injection of bile salts into the pancreatic duct sets up the same condition. If the bile salts are mixed and diluted with mucus, no pancreatitis follows. Infection of the ducts also of course produces pancreatitis. In cases such as those mentioned we may possibly explain the sequence of events in the following way. Probably as the result of some infection of the gall bladder by way of the blood or the lymph stream alterations occur in its mucous membrane. This in combination perhaps with stasis of the bile and excessive cholesterinæmia results in the formation of calculi in the gall bladder. The calculi further irritate mechanically the infected gall bladder wall which becomes thickened and loses its distensibility. When gas-forming food is taken, distension of the duodenum occurs, the common duct is compressed and bile is driven back into the gall bladder which cannot accommodate it. The increased tension causes pain and discomfort. Then stones begin to be driven down the ducts, causing colic and reflex disturbances. Finally a stone lodges in the ampulla, while the cystic duct also becomes obstructed. Bile unmixed with mucus is thus forced into the duct of Wirsung and causes pancreatitis. When this chances to involve the islets of Langerhans, glycosuria results. I have seen cases, however, of gall stones, pancreatitis and glycosuria in which at operation no stones were found in the ducts. In such cases the pancreatitis may be entirely infective or stones may have been lodged in the ampulla and been passed out prior to operation. Again I have seen several cases in which, although a stone was firmly implanted in the ampulla, no pancreatitis could be detected. This may be explained by the anatomical arrangements of the pancreatic and common ducts entering the duodenum separately. The duct of Santorini may also open separately so that the pancreatic secretion is not obstructed and bile salts are not forced into the duct of Wirsung. In the two cases narrated, so similar in many respects, one great difference was present. The gall bladder was contracted in one, Mrs. W., but large and distended in the other, Mrs. J.. The case of Mrs. J. seemed an exception to what is known as Courvoisier's law: "In cases of chronic jaundice due to blockage of the common duct a contracted gall bladder signifies that the obstruction is due to stone and, conversely, a dilatation of the gall bladder that the obstruction is due to causes other than stone." In Mrs. J.'s case, however, the jaundice was not very great and it is possible that the cystic duct became completely blocked at an early stage of the disease before the gall bladder had time to get contracted, while other and smaller stones gradually worked down to the ampulla. A somewhat similar case came under notice recently. An acutely inflamed and distended gall bladder was associated with severe glycosuria. The patient was given "Insulin" till the urine was sugar free and then the gall bladder was successfully removed under local anæsthesia. In the case of Mrs. W., the stone in the cystic duct was not impacted and probably did not block the duct and the gall bladder in all probability had previously become so contracted and hard from infection and irritation that it could not dilate. Also she had not had jaundice. The occurrence of jaundice with gall stones is very variable. When it is or has been present, it is a valuable corroboration of the diagnosis and is also suggestive of stone in the common duct, especially if associated with repeated attacks of colic. Stones may often be present in the common duct without jaundice and also jaundice may be present without stones in the duct. It must be remembered that the symptoms of gall stones apart from colic are chiefly due to the associated cholecystitis and infection which may also exist without gall stones. Hydatid of the liver may very closely simulate gall stones when the cyst has communicated with the hepatic ducts and when small cysts or pieces of membrane have passed down the ducts. But in such cases some enlargement of the liver can usually be detected on X-ray examination, if not by the usual methods. Moreover, the cysts may be found in the fæces. A further complication is that gall stones and hydatids may coexist; I have seen two cases of this. I have also seen syphilitic gumma of the liver near the portal fissure which simulated gall stones. The elicitation of a history of spirochætal infection may make one suspect such a condition. But in this case although we had this history, the symptoms so closely resembled gall stones that we operated. The gumma was cut and scraped out and resulting cavity was packed with gauze. The patient did very well.

### The Operation for Gall Stones.

In conclusion a few words about the operation which is the only treatment, once gall stones have been diagnosed. If jaundice is present, it is advisable to defer operation until the jaundice has subsided. This usually occurs. If not, operation must be undertaken, but chloride of calcium should be administered intravenously beforehand together with normal horse serum to diminish the risk of hæmorrhage. As regard the incision I have tried

all that have been suggested. I prefer one made along the middle of the upper rectus muscle, opening its sheath and reflecting the muscle laterally. If made sufficiently long, it gives efficient exposure and access and is not followed by the development of an incisional hernia. A thorough exposure is always advisable and thoroughness in exploring for all stones is the essential point. It is most extraordinary how elusive gall stones can be and how frequently they are not all removed. I always like to get the duct thoroughly exposed and, if at all dilated, to open it and with a probe down the duct and the fingers outside to work the stones up to the opening. To prevent stones slipping up into the hepatic duct during manipulation, a rubber protected clamp is placed on it high up as soon as it is exposed. The question as to whether the gall bladder be removed, must be decided on the merits of each case, the condition of the gall bladder and the condition of the patient. The function of the gall bladder is not known. Patients seem to get on very well without it, but it must have some function and on general principles, if it is functional, it should be left. If stones were recognized earlier and the operation performed in the early stages of the condition, the gall bladder would not require removal so frequently. But in many of the cases the gall bladder at operation is so infected and so altered as to be useless and is much better removed. The longer the stones have been present, the longer the infection and inflammatory sequelæ have gone on, the more adherent and contracted the gall bladder becomes, the more complications are likely to exist and the less able is the patient to stand its removal. It may then be wiser to get rid of the stones, drain the bladder and get the patient through; the gall bladder may be removed at a later operation. The surgeon has to use his own judgement as to what is best and judgement and experience seem to me of more importance in operations for gall stones than in almost any others. It is also in my experience more difficult to give a prognosis as to the result of operations for gall stones than for most other operations and the prognosis must always be guarded. Personally, I have had more fatal and more unsatisfactory results from gall stone operations than from any other, except those for cerebral tumour. But in the case of gall stones these bad results might have been avoided by earlier diagnosis and prompt operation.

I end as I began: Gall stones should be diagnosed in their early stages and always removed by operation once they are diagnosed.

## FLOUR MILLS AND HEALTH.

By D. M. McWhae, C.M.G., C.B.E., M.D. (Melbourne), M.R.C.P. (London),
*Honorary Physician, Perth Hospital, Western Australia.*

In 1922 at the request of the West Australian Flour Mill Owners' Association of Western Australia I carried out an investigation into the flour milling industry from the point of view of health. Ten mills were inspected and fifty employees were medically examined, so that the extent of the investigation was comparatively small.

### The Flour Milling Process.

Briefly, the wheat is dealt with as follows: It is received into what are called hoppers and is passed into silos for storage and distribution to the mill. It is then passed to the various cleaning or smutting machines which remove the covering of the wheat grain. Thence it is passed to the milling machines proper where it is ground to flour and finally it is bagged in the packing room.

It would appear that the smut dust from the indigestible covering of the wheat grain is far more irritating to the respiratory organs than flour dust and some of the older workmen described the earlier days of the flour milling industry, when they carried out all their work in a dense atmosphere of irritating smut dust.

In a clean modern mill great effort is made to keep the mill atmosphere free from dust. The buildings are light, airy and well ventilated. The hopper is frequently outside the mill buildings with overhead cover only and thus is practically in the open air. Often the wheat is subjected to powerful aspiration immediately it is received in the hopper. The silos are generally prevented from discharging dust into the mill atmosphere by being located in a separate room or building. The wheat cleaning or smutting machines are efficiently aspirated and the wheat cleaning section of the mill is separated entirely from the milling section. The milling machinery itself, if at all modern in construction, does not allow dust to escape into the air. The packing room is large and airy and the greater part of the bagging is done by machinery, so that manual labour here is reduced to a minimum as there must always be some dust in this part of the mill. Finally attention is paid to the bag cleaning machine which is well aspirated and situated in a large airy room. These and similar measures are some of the precautions necessary if flour mills are to be kept reasonably free of dust.

### Examination of Employees.

The employees selected for medical examination were those who worked inside the mills. Thus over forty of them were either millers, wheat cleaners or packers. The majority had worked for prolonged periods in mills, for example two had worked at this occupation each for over forty years, twelve had worked from twenty to forty years and twenty-six had worked from six to twenty years. Four of the men were sixty years of age or over, five were between fifty and sixty years, fifteen between forty and fifty years and nine between thirty-five and forty years. This long employment in mills does not appear to be incompatible with middle age or longevity.

The incidence of sickness among the men examined was very low. The total period during which they had worked amounted to seven hundred and fifty-eight years and the period of absence from work through sickness amounted to three years.

The occurrence of miners' phthisis among workers in mines suggested the possibility of the occurrence of similar trouble in mill workers. None of the men had any sign of active tuberculosis on physical examination. No history of hæmoptysis was obtained. Six of the men stated that they had suffered from pleurisy, three prior to and three subsequent to entering the mills, but in one of these latter the disability was probably influenza, not pleurisy. In only one were there any abnormal physical signs, namely some dulness at one lung base due probably to a thickened pleura. Apart from this no physical signs suggesting present or past tuberculosis were discovered. It would therefore appear that this trade does not predispose to tuberculosis.

It was thought that hay fever and asthma might be prevalent among mill workers. None of them, however, had suffered from hay fever and only one miller who had worked for forty years in mills, some of them "terribly dirty," had suffered from acute attacks of asthma. It is probably quite impossible for people who are sensitive to wheat dust, to work inside flour mills. As soon as they enter a mill they get acute hay fever or asthma and have therefore to give up the occupation at once.

The is undoubtedly in mill workers a tendency to catarrh of the upper air passages. Thirty of the men examined complained of some cough or hacking in the throat with slight increase in sputum. This disability seemed to have no effect on the general health. Eight of the men complained of occasional wheezing or tightness in the chest, but two had suffered from wheezing or bronchitis before entering the mills. In only one were there any rhonchi on physical examination. Five of the eight men had been in mills from twenty-three to forty years and had worked in earlier times in very dirty mills. It is probable, therefore, that there is a tendency to the occurrence of chronic bronchitis in dirty mills. In clean modern mills it is likely that this tendency has been largely eliminated. There was little to suggest the occurrence of fibrosis or emphysema of the lung. The wind of the men was stated to be good or fair in forty-three cases and to be short after exertion in seven, while there was practically no evidence of fibrosis or emphysema on physical examination.

Some of the men complained of slight irritation of the eyes, but no sign of conjunctival inflammation was noticed in any of them. Two of the older men suffered from arterio-sclerosis and albuminuria occurred in one man whose blood pressure was raised (210 millimetres of mercury, systolic and 105, diastolic); otherwise there were no abnormally raised blood pressures. There is therefore no tendency to cardio-vascular or renal degeneration. None of the men had definite anæmia or enlarged spleens and none had diabetes. One had exophthalmic goitre of a severe grade, but it is unlikely that this had been caused in any way by his occupation.

Forty of the men examined would have passed as first class lives on the standard adopted for life assurance. Although the number of men examined was far too small to justify too definite conclusions, it would nevertheless appear that flour milling as carried out in clean modern mills is not injurious to health. There is no tendency to tuberculosis or fibrosis and emphysema of the lungs, but every effort must be made to keep the mills atmosphere dust-free in order to prevent the occurrence of catarrh of the upper air passages and bronchial tubes. This is carried out successfully in any clean, up-to-date mill.

## AN INVESTIGATION INTO THE FLOUR MILLING INDUSTRY IN VICTORIA.

By Walter Summons, O.B.E., M.D., D.P.H.,
*Member of the Health Commission of Victoria.*

From February, 1920, I carried on at intervals for the next two years at the request of the Flour Mill Owners' Association an inquiry into the healthiness or otherwise of the flour milling industry in Victoria. The publication of the results of the investigation has been delayed as there was a possibility of the question of hours of work of the employees being again a matter of dispute before the Federal Arbitration Court. Prior to February, 1920, the work period had been forty-eight hours each week. The Court then reduced the hours to forty-four hours per week and will not again hear a dispute in which the length of the working week is in question. Though the industry is not necessarily a continuous industry, there is in the large mills at all events a system of three working shifts. These shifts change weekly in regular sequence from morning to afternoon and to night shifts. As it is universally admitted, there is no need to enlarge on the unnaturalness of an individual changing his hours of work, sleep, meal times and habits weekly. Any variation, however, in the length of the working week will not obviate this continual change over and apparently the requirements of the industry demand more than one shift a day.

The men employed in the mills claimed that it was a dusty occupation, that the dust produced catarrh, that the swallowing of uncooked flour was the cause of indigestion and that they lost weight. It is necessary to comment that the flour dust itself is a sterile organic dust with no physically irritating properties like silica dust or chemical irritating action like the dust or fumes of chemical works. That the wheat is contaminated with earth dust is recognized later.

The investigation consisted of observations made on the working conditions in the mills and secondly of medical examinations of the employees.

### Working Conditions in the Mills.

Though there is no difference in the milling process in the country or the metropolitan mills, still it was deemed advisable that certain country mills should be seen, as it was claimed that the earth dust was more irritating from some localities than from others. No evidence was found to support this claim.

In all fifteen mills were examined, eight in the country and seven in the metropolis, most of these latter being visited three times. The machinery requires that the several stages of milling be done one above the other, so that the mills all were of three or more stories, each of which was abundantly provided with windows on all sides. The ventilation was adequate. When a mill is enlarged it is done by the addition of a separate and almost complete unit and not by the enlarging of existing machinery. All the mills with one small exception were up to date, with the workings completely enclosed and fitted with automatic exhaust pumps and with appliances for dust collecting. The impression created on going over the mill is the remarkable freedom from dust. Thus when men are proceeding about the mill, they are not exposed to dust. When they engage in some of the particular forms of work, they may temporarily be exposed to dust, as for example when a "choke" occurs. The efficient ventilation and mechanical appliances appear to have improved infinitely the working conditions.

The nature of the work varies in different parts of the mill and whilst in the smaller mills a man may have several duties, in the larger mills the men are more or less employed only on one particular class of work. The occupation cannot, therefore, be treated as a whole, but special mention must be made of several groups of employees. The hand cleaning of the silks has largely been done away with. Bag cleaning is now done in an enclosed space to which is affixed an exhaust fan. The filling of the flour bags is done with dust-proof machines and by screw feeders so that dumping is unnecessary. The men on the smutters or dust collectors are those most exposed to dust and certain of these suffered from catarrh of the upper respiratory passages. These smutter men are exposed to the soil dust that escapes from the wheat cleaning machines. The men who open the bags and empty the wheat into hoppers, are also exposed to the dust of the silicates from the dry earth, but this work is done always in the open air. These men and the store hands who move the bags of wheat or flour, have a no less healthy occupation than the average road labourer or farm worker.

In the older books on industrial hygiene it was recognized that there was a danger to health from flour milling because of the constant cloud of dust. Millers' asthma was a term used and the industry was regarded as predisposing to tuberculosis. From my personal observation of the working conditions where modern machinery is installed, it can be confidently stated that there is no justified claim to ill-health through the nature of the work.

### Examination of the Employees.

As complete a medical examination as possible was made at the mills during the hours of work. A physical examination was done, pulse and respiratory rates taken, heights and weights measured and an inquiry into the medical history was made in every instance. As the details are of but little medical interest, the results only are set out and as concisely as possible.

The examinations totalled one hundred and seventy-two, but as fifteen men were examined twice the number of individuals was one hundred and fifty-seven. Of these one hundred and nineteen were employed in the mills and thirty-eight in the stores.

The ages of the employees were as follows: Thirteen men were under twenty years of age, forty-six were between twenty and thirty, forty-six between thirty and forty, twenty-nine between forty and fifty, eighteen between fifty and sixty and six were over sixty years of age.

The length of time for which the men had been employed, was as follows: Nine men had been employed for under one year, forty-one for periods between one and five years, thirty-seven between five and ten years, thirty-one between ten and twenty years, fourteen between twenty and thirty years, seventeen between thirty and forty years and five for over forty years.

The physical defects, many of which were of a trifling nature and none such as to prevent the man working, were:

(*a*) Of a respiratory nature, 16; cause definitely not due to the industry, 10; causation indefinite, 6 (two of these were millers, two were packers, one was a topman and one a bag cleaner).

(*b*) Of a digestive nature, 15; cause definitely not due to the industry, 9; causation indefinite, 6 (three were storemen, two were packers and one a topman).

(c) Other disabilities of various sorts, 8 (these were: Insomnia 3, headaches and deafness 2, paralysis 1, hernia 1, skin abscesses 1).

The defects put down as the result of indefinite causation—as for example catarrhal pharyngitis, hyperchlorhydria—were such that they might have resulted from the occupation or from a number of causes quite apart from the occupation.

The claim that the employees lost weight was investigated as fully as possible. It was discovered that when compared with the tables issued by the Australian Mutual Provident Society the weights for heights of the men at the milling were less than those on the standard scale. The explanation probably is two-fold. Firstly, milling attracts men of light physique and secondly the Australian Mutual Provident Society tables are based on figures mostly representing the weights of business men and of others following sedentary occupations and only to a lesser extent do they include the weights of industrial workers. No cause for the lightness of the weights could be found in the occupation and no evidence of loss of weight while milling was secured.

### Conclusion.

My conclusions were that wheaten flour milling as carried on in Victoria with the aid of modern machinery has extremely little occupational hazard. The findings are mainly negative, but seeing that the investigation took a considerable time, it seems wise to place the results on record, more especially as industrial hygiene is engaging greater attention than formerly.

## CANCER AND ACQUIRED RESISTANCE TO TUBERCULOSIS.

By Thomas Cherry, M.D., M.S. (Melbourne),
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Preliminary Report.

A suggestive feature in recent reports on public health from many parts of the world is the steady decline in the number of deaths from tuberculosis and the equally steady advance of cancer. In the first English records more than eighty years ago this compensating movement was already apparent, but at that time cancer was quite unimportant as compared with phthisis. By 1855 the phthisis rate had fallen to 2,600 per million and the cancer rate had advanced to 320. The two rates are now about equal in England and Wales. The changes which have taken place in the past thirty years and the percentage reduction and increase in the respective rates in each five year period are as shown in Table I.

Table I.—Mortality Rates per Million Living.

| Periods. | Phthisis. | Percentage Reduction. | Cancer. | Percentage Increase. |
|---|---|---|---|---|
| 1871-1875 | 2,217 | — | 445 | — |
| 1876-1880 | 2,038 | 8.2 | 494 | 11.0 |
| 1881-1885 | 1,830 | 10.1 | 548 | 11.0 |
| 1886-1890 | 1,635 | 10.6 | 632 | 15.3 |
| 1891-1895 | 1,461 | 10.6 | 712 | 12.6 |
| 1896-1900 | 1,323 | 9.4 | 800 | 12.3 |
| 1901-1905 | 1,218 | 8.0 | 867 | 8.4 |
| 1906-1910 | 1,106 | 8.4 | 939 | 8.3 |
| 1911-1915 | 1,046 | 5.4 | 1,054 | 12.2 |

The fact that the one disease appears to a large extent to be taking the place of the other may be a chance coincidence and these figures cannot be applied to the problem without further analysis. Not only do the two diseases affect different periods of life, but in England the history of the rise of cancer and the decline of phthisis is different in the two sexes. While it is possible that occupation may have as great influence in the one case as in the other, this is at the present time little more than a surmise.

Perhaps the most important material bearing upon this question is the Supplementary Reports of the Registrar-General for the years 1891, 1901 and 1911. These contain an analysis of the deaths of all males over the age of fifteen which were registered in the three consecutive years of each census period. Each report contains about half a million deaths classified by occupation, age and causes of death. Table V. gives the "comparative mortality figures," or in other words the relative expectation of life for most occupations (Report, 1911, page 22). After deducting deaths by accident I selected occupations with approximately 200,000 deaths, half those with the best and half with the worst expectation of life. These may be arranged as in Table II.

When the cancer rate is expressed as a percentage on the total number of deaths in each case it falls somewhat more heavily on the "best" lives. But cancer attains its greatest frequency about the age of sixty-five and a much larger proportion of the "best" lives reaches that age. If we express the rate for the age period sixty-five as the percentage on all the deaths after sixty-five, the rate is lower for the "best" lives. Throughout this investigation the cancer rate is calculated for any given age period as a percentage on all the deaths from the beginning of that age period to the end of life, that is on the number exposed to the risk. In this way the following results are obtained:

Table III.—Age Incidence of Cancer on 200,000 Deaths in 1911.

| Classification. | Age Periods. | | | | |
|---|---|---|---|---|---|
| | 25-34 | 35-44 | 45-54 | 55-64 | 65 to end. |
| "Best lives" .. .. .. | 0.18 | 0.60 | 1.8 | 3.9 | 9.0 |
| "Worst lives".. .. .. | 0.21 | 0.81 | 2.7 | 5.2 | 9.8 |

The large number of deaths from cancer in men following occupations corresponding to those represented by these "best" lives has probably created an impression that cancer selects those in easy circumstances and passes by the poorer and the working classes. But this table, comprising nearly half the deaths of men in England during three years, proves that this is not the case. Cancer selects the survivors of the occupations which have involved a hard struggle for existence. The "worst" lives are more heavily hit at every age period.

In order to test whether these results applied generally, I turned to Social Class I. of this Report. This is described as "upper and middle classes" and comprises after deducting accidents 45,557 deaths over the age of twenty-five. Of these 45.3% were over the age of sixty-five. Corresponding figures from the coal-miners are 20,992 deaths of which 38.8% were over the age of sixty-five. The expectation of life was therefore much better in Social Class I., but on analysing the two groups of deaths the results are quite the opposite from those of Table III.

Thus in the last two age periods which are all-important in regard to cancer, the coal-miners were much better off than the upper and middle classes,

Table II.

| Classification. | Total Deaths Over 15 Years. | Total Deaths from Cancer. | Cancer Under 65 Years. | Deaths at 65 and Over. | Cancer at 65 and Over. |
|---|---|---|---|---|---|
| "Best lives" .. .. .. .. | 98,413 | 9,745 = 9.90% | 5,011 | 52,366 | 4,734 = 9.23% |
| "Worst lives' '.. .. .. .. | 100,011 | 9,366 = 9.35% | 5,897 | 35,323 | 3,469 = 9.86% |

Table IV.—Cancer Incidence by Age, Coal Miners and Social Class I., 1911.

| Classification. | Age Periods. | | | | |
|---|---|---|---|---|---|
| | 25-34 | 35-44 | 45-54 | 55-64 | 65 to end. |
| Coal Miners .. .. .. | 0.26 | 0.92 | 2.6 | 4.4 | 6.6 |
| Social Class I. .. .. | 0.23 | 0.75 | 2.6 | 5.0 | 11.1 |

whereas from Table I. we should have expected the opposite to be the case. Amongst the differences in the causes of death in these two classes of men is the fact that Social Class I. has about 15% more deaths from phthisis than the miners at all ages and that when the two age periods 25-35 and 35-45 are taken as the basis of comparison, this excess amounts to more than 25%. I found that the percentage of phthisis on these two age periods formed the best available index for the incidence of this disease at all age periods and on this basis fifty-eight thousand deaths were compiled from occupations in which the index was less than 3.10 and more than 8.50 respectively.

Deaths by accident, all deaths under twenty-five and occupations in which the total deaths were less than one thousand were omitted from the lists.

Table V.—Age Incidence of Cancer in Relation to Phthisis, 1911.

| Classification. | Age Periods. | | | | |
|---|---|---|---|---|---|
| | 25-34 | 35-44 | 45-54 | 55-64 | 65 to end. |
| 58,866 Lowest Phthisis | 0.12 | 0.42 | 1.38 | 3.47 | 9.23 |
| 56,716 Highest Phthisis | 0.30 | 1.00 | 3.25 | 5.60 | 9.86 |

It will be seen that in all the age periods except the last the incidence in the low phthisis group is only about half of that in the high phthisis group. But in contrast to this striking correlation of the two diseases we find that amongst the occupations included in both lists there were some, such as solicitors and barristers, which had a low phthisis and high cancer rate, and conversely tool makers and others which had high phthisis rates associated with low cancer. On attempting to chart the occupations on the basis of cancer and phthisis for 1911 the results were not satisfactory.

It then struck me that we were comparing unlike things; that resistance to tuberculosis is probably established or lost fairly early in adult life and therefore the proper method was to compare the incidence of cancer with the incidence of tuberculosis in the same occupation twenty-five or thirty years earlier. Unfortunately the details in the earlier census reports do not include the ages as well as the causes of death and that for 1891 is the earliest available material.

From the report for 1891 I arranged according to their phthisis index the occupations that could be traced forward to 1911. This index was taken from the two age periods, 25-35 and 35-45. The cancer index is the sum of the four cancer percentages from 25-35 to 55-65. As before occupations with less than a thousand deaths, deaths under twenty-five and accidents were omitted. The number of deaths available for analysis is about 320,000.

The drift of the two diseases may be seen from the following groups of occupations.

Table VI.

| Group. | Number of Deaths. | Phthisis Index. | | Cancer Index. | |
|---|---|---|---|---|---|
| | | 1891. | 1911. | 1891. | 1911. |
| A | 45,712 | 3.87 | 2.37 | 3.66 | 5.01 |
| B | 52,835 | 6.47 | 4.59 | 4.82 | 7.17 |
| C | 66,676 | 9.83 | 7.01 | 4.51 | 8.12 |
| D | 74,736 | 12.68 | 7.92 | 6.18 | 9.92 |
| E | 26,018 | 19.20 | 12.13 | 6.76 | 12.95 |
| Total | 265,977 | | | | |

These groups comprise the following occupations:

Group A.

1. Farmers.
2. Clergy.
3. Farm workmen.
4. Wheelwrights.
5. Coal merchants and retailers.
6. Sawyers.

Group B.

7. Brickmakers.
8. Gardeners.
9. Coal-miners.
10. Railway plate-layers.
11. Fishermen.
12. Blacksmiths.
13. Greengrocers.
14. Innkeepers.
15. Bargemen.

Group C.

16. Labourers (other than farm labourers).

Group D.

17. Railway officers and clerks.
18. Railway drivers and stokers.
19. Railway porters, guards and signalmen.
20. Coach and 'bus drivers and grooms.
21. Draymen and carters.
22. Watchmen and messengers.
23. Engineers and boilermakers.
24. Iron trades.
25. Painters and plumbers.
26. Printers.
27. Dyers.
28. Butchers.
29. Gasworkers.

Group E.

30. Hotel employees.
31. Musicians and theatre employees.
32. Commercial travellers.
33. Commercial clerks.
34. Wharf labourers.
35. Coal-heavers.
36. Brass-workers.
37. Paperhangers.
38. Brewers.

The incidence of cancer by age periods in these groups is set out in Table VII.

From this analysis of more than 82% of the deaths available for this investigation the following results appear.

(i.) When the groups are arranged on the basis of the phthisis percentage in 1891, the incidence of cancer in 1911 formed nearly a complete sequence for every age period.

(ii.) With few exceptions cancer in the occupations with both high phthisis and high cancer in 1891 increased at a much faster rate between these dates than in those with the lowest phthisis rate in 1891.

(iii.) The incidence of cancer at all age periods in 1911 was always light or heavy in accordance with the phthisis incidence on the same group.

Table VII.—Age Incidence of Cancer, 1891 and 1911.

| Classification. | | Age Periods. | | | | |
|---|---|---|---|---|---|---|
| | | 25-34 | 35-44 | 45-54 | 55-64 | 65 to end. |
| Group A | 1891 | 0.09 | 0.37 | 0.90 | 2.3 | 4.9 |
| | 1911 | 0.11 | 0.40 | 1.21 | 3.29 | 8.99 |
| Group B | 1891 | 0.13 | 0.48 | 1.37 | 2.84 | 4.77 |
| | 1911 | 0.19 | 0.69 | 2.13 | 4.16 | 8.32 |
| Group C | 1891 | 0.14 | 0.44 | 1.42 | 2.51 | 4.21 |
| | 1911 | 0.17 | 0.71 | 2.36 | 4.88 | 8.85 |
| Group D | 1891 | 0.20 | 0.69 | 1.88 | 3.41 | 4.86 |
| | 1911 | 0.27 | 0.89 | 3.00 | 5.76 | 10.00 |
| Group E | 1891 | 0.23 | 0.66 | 2.02 | 3.8 | 5.4 |
| | 1911 | 0.29 | 1.10 | 3.9 | 7.3 | 11.2 |

(iv.) During these twenty years there was no instance of an occupation which showed reduction in phthisis without showing increase in cancer.

This series of correlations may be due to chance, for as the one disease is declining and the other increasing, it is possible though not very probable that every occupation should be normal in both respects. If there is a causal relationship, the cause must come out of phthisis and act upon cancer, for the one occurs early and other late in life. The probability of cause and effect grows with each successive step, as we establish the following propositions:

1. A similar relationship of decline and increase cannot be demonstrated between cancer and any other disease or group of diseases.

2. The correlation of phthisis and cancer is found not only in the groups, but in each of the thirty-eight occupations which constitute the groups. Most of the occupations with less than one thousand deaths also fall in line. The few exceptions to this rule will be noticed subsequently.

3. There is a recognizable element of proportion in the correlation. In a broad way we can say: "A large increase in cancer means a large reduction in phthisis; little phthisis in 1891 and little cancer in 1911." I have not yet been able to define this element of proportion. From the report the course of the two diseases can be compared in a number of allied occupations. In such a group many variable factors are greatly simplified, such as the type of man, the question of inherited tendencies, the conditions of life and food supply and of wages. Such factors are more involved when we compare coal-miners with another social class than when we compare miners in Lancashire with those in Yorkshire.

4. The same element of proportion is seen in the graph (see page ***) in which cancer in 1911 is plotted against phthisis in 1891. Ninety-five *per centum* of all the deaths are included in the occupations which fall within the area bounded by the lines which diverge at an angle of 12°. It is possible that this angle would be less if the phthisis index could be built up from percentages of age periods earlier than 25-35. The probability of chance becomes less as the angle becomes less. When the same occupations are plotted against phthisis in 1911, the angle is 25°.

Table VIII.—Phthisis and Cancer in Allied Occupations

| Occupation. | Phthisis Index 1891. | Cancer Index 1911. |
|---|---|---|
| Textile Manufacturers— | | |
| Silk | 37 | 41 |
| Hosiery | 77 | 62 |
| Wool | 88 | 71 |
| Cotton | 113 | 73 |
| Dyers | 110 | 98 |
| Iron Trades— | | |
| Blacksmiths | 72 | 74 |
| Shipbuilders | 88 | 77 |
| Iron manufacturers | 96 | 91 |
| Wagon works | 99 | 95 |
| Brass works | 176 | 115 |
| Building Trades— | | |
| Sawyers | 46 | 66 |
| Carpenters | 90 | 78 |
| Bricklayers | 110 | 98 |
| Plasterers and paper-hangers | 113 | 119 |
| Slaters, tilers | 135 | 134 |
| Coal-Miners— | | |
| Staffordshire | 44 | 133 |
| Lancashire | 65 | 135 |
| Wales | 69 | 142 |
| Durham, Northumberland | 72 | 150 |
| Derby and Nottinghamshire | 74 | 153 |
| Yorkshire | 85 | 158 |

5. By means of the percentage of cancer on the three youngest age periods it is possible to foretell what the incidence will be in later life. The same factor decides the incidence in all the age periods from twenty-five onwards. This rule is, I think, invariable and if established it almost precludes the possibility of chance. Take, for instance, the actual number of deaths from cancer in two occupations about equal in size in 1911, gardeners and clerks (commercial, law, bank and insurance).

Table IX.

| Age Period. | Gardeners. | | Clerks. | |
|---|---|---|---|---|
| | Quota. | Deaths from Cancer. | Quota. | Deaths from Cancer. |
| 25-34 | 9,975 | 9 | 10,455 | 44 |
| 35-44 | 9,541 | 45 | 8,830 | 102 |
| 45-54 | 8,951 | 162 | 7,184 | 271 |
| 55-65 | 7,993 | 324 | 5,265 | 353 |
| 65 to end | 6,236 | 639 | 3,155 | 363 |

6. A time element is found in the coordination of phthisis and cancer. An inspection of the graph shows that in 1891 all the occupations were nearer to the cancer base line than in 1911. If we could make a similar graph for earlier periods the dots would be still nearer this base line. In 1861 the cancer rate in men was 220 as against 900 in 1911. Cancer had not yet made any very great progress in England and hence the factor which has determined the present rate of increase, has apparently been in operation for about sixty-five years.

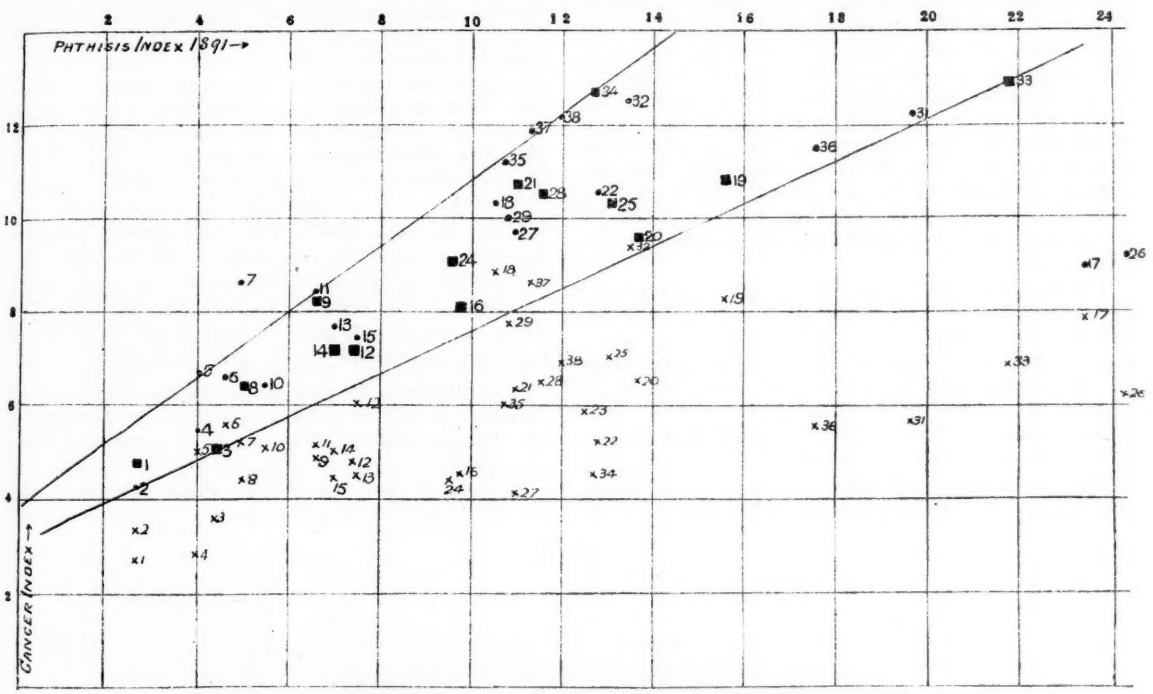
7. In men an increase in the cancer rate of 17.5% occurred in the five year period 1881-6. This period

was also marked by the first decided reduction in the phthisis rates for men between the ages of forty-five and sixty-five.

When the three census periods are compared, it is found that the reduction of phthisis and the increase of cancer has taken place by two methods. Some occupations have changed in both respects at a nearly uniform rate, so that in a graph the three points are joined by a straight line. In others a great reduction in tuberculosis in the first ten years is followed by a sharp rise in cancer in the second, so that the position for 1901 is the point of an obtuse angle. It is noteworthy that in very few cases is this a right angle and in only two cases has there been an increase of phthisis between 1901 and 1911, so that the angle becomes less than a right angle. In no case whatever did a reduction in phthisis take place between 1891 and 1911 without an increase in cancer.

On examining the graph it will be found that the three railway occupations, Nos. 17, 18, 19, differ from the others in showing much less increase in cancer than would be expected from their position in relation to phthisis. In the three census periods they have each shown an extraordinary number of deaths from phthisis in the age-period 25-35 as compared with the following periods. This has raised the phthisis index so that their position in the graph is abnormal in being much too far to the right. I presume the remarkably small amount of phthisis in the age periods 35 to 44 and 45 to 54, is due to the railway companies rigidly weeding out their sickly employees.

A small number of occupations, including about twelve thousand deaths, have been rejected for a variety of reasons. Of these the most important is




Graph.—Relative Positions of Occupations, 1911.
■ = Occupations with more than 4,000 deaths; ● = occupations with less than 4,000 deaths; x = corresponding positions in 1891. The numbers refer to the groups of occupations.

In the following group I presume that the reduction in phthisis has been a process which has occupied a longer time than usual. A great reduction in tuberculosis and a considerable increase in cancer had taken place by 1911, but I anticipate that the sharp rise in cancer will be disclosed by the census of 1921.

Group F.—34,707 deaths—1891: Phthisis index, 1,274; cancer index, 490. 1911: Phthisis index, 780; cancer index, 775.

| | |
|---|---|
| Watchmakers and jewellers. | Potters. |
| Tool makers and cutlers. | Bakers. |
| Cabinet makers. | Teachers. |
| Cotton weavers. | Tailors. |
| General store keepers. | Drapers. |
| Booksellers. | Private servants. |

the change of occupation which often occurs in a man's life time. Thus law clerks have a very high index for both diseases, while solicitors and barristers are high in cancer and low in phthisis. Many of the men who died in the senior branch of the legal profession, began life as clerks. In the same way many of the physicians who died in 1891, started as apothecaries. So also successful costermongers become store keepers and successful brick layers and carpenters become builders.

In this investigation the deaths in each occupation have been treated as a self contained unit of the population which died out completely in the three years of the census period. No attempt has been made to connect them with the living members of the same occupations who filled in census papers. This method has given a high degree of uniformity

to the results set out in this paper. For the last age period, 65 to end, the deaths from any given disease are expressed as a percentage of all the deaths after sixty-five. For the next preceding age period a quota is found by adding togther all the deaths of the last two age periods. The percentages are then calculated on all the deaths which occurred after fifty-five and so on for the earlier age periods. As an example we may say from Table VII. that 4.88% of labourers over the age of fifty-five died of cancer before they reached the age of sixty-five. The drawback of this method is the fact that in any year in which the mortality was excessive, as for example from influenza, all the percentages from cancer are too low, because the total number of deaths is excessive and the deaths from cancer are not perceptibly affected by influenza; on the other hand the deaths from phthisis are greatly increased by influenza and this percentage is higher than normal. This objection does not, however, apply to the comparison of occupations with one another at each census period, because they all have been in the same relation to any such disturbing factor. The Registrar-General's reports include deaths from fifteen and upwards in each occupation, but the number of deaths in the age period 15-25 is so variable in proportion to the total deaths in many of the occupations that I decided to begin with the age of twenty-five.

I have given the data for phthisis throughout this paper, because other forms of tuberculosis are not set out in reports earlier than that for 1911; but in any case phthisis covers about four-fifths of the deaths and it is also the most important source of infection, so that it is possible that cancer rises and falls in relation to phthisis rather than to tuberculosis in general.

The statistical treatment of cancer is not a simple matter and it becomes more complicated when we aim at exhibiting its relationship to phthisis in the same analysis of the deaths. Nearly the whole cancer mortality in males falls after the age of thirty-five, while half the deaths from tuberculosis occur before that age. Those occupations in which a high proportion of the deaths are at sixty-five and upwards, are treated unfairly when the cancer rate is calculated on "all ages" or even on the total deaths in adult life. The importance of separating the age periods may be illustrated by comparing the deaths of gardeners and commercial clerks when calculated by different methods (see Table X.).

When the facts are presented in this form, it appears that the gardeners have much the higher cancer rate, the difference in the proportions of those who die over the age of sixty-five, completely masks the true state of the case. The larger number of deaths at the lower rate more than balances the smaller number at the higher rate. When the rates are calculated on the numbers of persons who reach any given age, that is on what may be called the "survivors" beyond that age, the results are very different. Building up the quota for each period in the way already described the same facts appear in Table XI.

There is little doubt that this picture presents the true view of the progress of the two life histories, the incidence of both diseases being much heavier on the clerks at every age period. The percentage on each quota is the actual incidence of each disease on all the men who reached a given age.

The question then arises as to the best way of forming an index to represent the incidence for all the age periods. The report for 1911 contains standardized rates for each occupation for four ten year periods and the sum of these rates is taken as the index for a given disease. Following this

TABLE X.

| Occupation. | Deaths. | | | Death Rate. | |
|---|---|---|---|---|---|
| | Total. | Cancer. | Phthisis. | Cancer. | Phthisis. |
| Gardeners | 9,975 | 1,179 | 609 | 11.79 | 6.09 |
| Commercial Clerks | 7,939 | 861 | 1,590 | 8.26 | 20.02 |

TABLE XI.

| Occupation. | Age. | Quota. | Cancer. | | Phthisis. | |
|---|---|---|---|---|---|---|
| | | | Deaths. | Rate. | Deaths. | Rate. |
| Gardeners | 25 | 9,975 | 9 | 0.1 | 163 | 1.6 |
| | 35 | 9,541 | 45 | 0.5 | 143 | 1.5 |
| | 45 | 8,951 | 162 | 1.8 | 138 | 1.5 |
| | 55 | 7,993 | 324 | 4.0 | 114 | 1.4 |
| | 65 | 6,236 | 639 | 10.2 | 51 | 0.8 |
| Commercial Clerks | 25 | 7,939 | 39 | 0.5 | 692 | 8.6 |
| | 35 | 6,585 | 79 | 1.2 | 474 | 7.2 |
| | 45 | 5,231 | 206 | 4.0 | 246 | 4.7 |
| | 55 | 3,773 | 273 | 7.2 | 134 | 3.5 |
| | 65 | 2,214 | 264 | 11.9 | 44 | 2.0 |

precedent I decided to close the index at sixty-five, but no difference in the conclusions drawn from this analysis would be made by including the last period. In the graph the angle would have been 14°, instead of 12°, in order to include 95% of the 266,000 deaths.

The selection of the index for phthisis is a more difficult matter. For reasons which I hope to consider in another paper, there are objections to the inclusion of the later age periods as representing the true incidence of phthisis at any time prior to about 1900. The two age periods 25-35 and 35-45 appeared to be the best for my purpose, but it is quite possible that this index will require to be modified in the light of future experience.

The foregoing results appear to be conclusive against the theory that cancer is simply one of the degenerations of old age and that the present increase is due to the higher percentage of people that now reaches old age. By the methods I have adopted, it is easy to calculate the percentage that reached sixty-five in relation to the number that entered any given occupation at twenty-five. If the occupations are grouped on this basis it is found that in most cases the higher the percentage that reaches sixty-five, the lower is the cancer incidence at all age periods. Thus, in 1911 66.8% of the deaths in Group A. were over the age of sixty-five, while this percentage in Group E. was 25.4. But the cancer rate for Group E. was higher than that for Group A. at every age period, whereas if cancer depended chiefly on old age, the opposite should be the case. Again, if old age was the dominant factor we should expect the cancer rate to increase steadily up to the end of life, as is seen in the deaths from cerebral hæmorrhage, but this is not the case.

Table XII.—Percentage of Cancer and Apoplexy in Men.

| Cause of Death. | Year. | Age Periods. | | |
|---|---|---|---|---|
| | | 55-64 | 65-74 | 75 to end. |
| Cancer .. .. .. | 1911 | 4.7 | 6.7 | 6.1 |
| | 1921 | 6.0 | 8.5 | 7.9 |
| Cerebral Hæmorrhage .. .. | 1911 | 2.4 | 5.2 | 8.0 |
| | 1921 | 2.2 | 5.3 | 9.5 |

There is perhaps an analogy between the two diseases in this respect. Apoplexy in early life may usually be explained by the presence of a predisposing factor which either raises blood pressure or weakens the wall of the vessel. Apoplexy late in life seems to have been common from the earliest times. Cancer at all ages over thirty-five has increased so much during the past forty years that the disease has become a new problem in all civilized countries. This fact alone makes it probable that the old causes which produced a small number of cases in the past, are now at work on a type of population that has been specially prepared for the disease.

The history of tuberculosis in England seems to have been marked by a great and very rapid increase of the disease in the early part of last century. In earlier times the population was mainly rural and the conditions were similar to those existing amongst agricultural labourers fifty years ago. The growth of the factory system with child labour, long hours and bad hygienic conditions was mainly responsible for the great epidemic of tuberculosis which has lasted about a hundred and fifty years. As early as the year 1840 there are references to the appalling incidence of phthisis in such occupations as brass and steel polishing, cutlers, weavers and coal heavers. It is said that the "dry grinders" amongst the Sheffield cutlers all died before they reached the age of thirty-two. In some localities hardly a family could be found which was not affected with the "strumous disposition." After allowing for some exaggeration in such generalizations, there can be little doubt that the high figures of all the early annual reports are fully justified. With the great improvement in food supply and the slower amelioration of the other conditions recovery from a definite attack of phthisis would become more common. In some cases a high degree of immunity might be developed without the occurrence of a recognized attack of phthisis. Let us suppose that frequent contact with tubercle bacilli developes powers of resistance in the individual perhaps on lines similar to what is known to be the case in diphtheria and other diseases. If this resistance includes a quickening of the readiness to proliferation of cells in response to a special form of stimulus, most of the facts discussed in this paper at once fall into line. The proliferation is seen in the typical epithelioid cells of the miliary tuberculosis.

The development of powers of resistance to tuberculosis in people who did not succumb to that disease, might thus form a predisposing cause of cancer in later life. The greater the percentage of phthisis in any occupation, the greater the chance of any given individual either dying of the disease or else developing powers of resistance to it. A century ago the unfavourable surroundings usually turned the scale against the patient.

If phthisis acts as a predisposing cause of cancer, I think it will be possible to a great extent to explain the difference in the history and incidence of cancer in women as compared with men. There are differences in the cancer rates in different countries which may also be cleared up.

Further light on the relationship of cancer and tuberculosis may be obtained by reports on the family history of cancer patients. About fifteen years ago Williams, of the Cancer Hospital, London, expressed the view that when several members of a family had died of phthisis, the survivors were very apt to develope cancer. So far as I know no material exists at present for following up this line of inquiry.

*Post mortem* reports on cases of cancer should include a careful search for the signs of obsolete tuberculosis. Here again there are a few casual references to the association of the two conditions, but these do not cover a sufficient number of cases to be of much value.

The facts I have brought forward, may suggest lines along which a clinical test for early cancer may be worked out.

Finally, it should be possible to determine by experiment whether heightened resistance to tuberculosis has any effect upon the fate of transplanted cancer cells and upon the readiness with which irritation cancers can be produced.

Under any circumstances cancer work is a slow and expensive process, but here is at least one definite problem the solution of which should be attempted without delay.

The conclusions suggested by this statistical inquiry can be affirmed or refuted by experiment.

## Reports of Cases.

### PROGRESSIVE MUSCULAR ATROPHY.

By Ernest Chenoweth, M.D. (Melbourne),
*Medical Superintendent, Mackay District Hospital, Queensland.*

P.M., a male patient, aged sixty-three years, was first seen by me early in July, 1924. He complained of weakness of the left arm and twitchings in the muscles in various parts of the body.

About six weeks previously he first noticed a weakness of the fingers of the left hand. Some six hours later he became delirious, calling loudly for help and experiencing severe præcordial pains. This acute stage lasted a few hours and he then noticed a constant twitching of the muscles of the chest. He became very weak and was confined to bed for a fortnight.

During the first day after onset the twitchings extended to the left superior extremity, the right superior extremity becoming involved one week later. Twitchings appeared in the inferior extremities just prior to examination.

There had never been any pain except in the left arm following moderate exertion. The appetite had been good throughout, although he had lost 6.35 kilograms (one stone) in weight in the six weeks. His general nutrition appeared good.

On examination the remarkable fibrillary muscular twitching was most obvious and apparently affected the whole of the muscles both of the trunk and the limbs. This quivering myokymia was more evident in the *pectorales* and the muscles of the arms, but was also very definite in other muscle groups even to the *interossei* muscles of the hands and feet.

There was considerable wasting of the muscles of the left shoulder girdle and left superior extremity, the thenar, hypothenar, interosseous and lumbrical groups being specially involved. Both knee jerks and ankle jerks were definitely exaggerated.

Apart from the above findings no other departure from the normal was elicited or detected.

On seeing the patient a month later his condition was much the same, although the weakness in the left superior extremity was more extensive.

My purpose is reporting this case is to draw attention to the unusually extensive distribution of the typical myokymia and the acute infective nature of the onset.

## Reviews.

### CRIME AND INSANITY.

Dr. W. C. Sullivan': "Crime and Insanity" is a classical textbook of both the medical and legal aspects of the criminal insane.[1] Many theories have been formulated to account for the anti-social tendencies of the criminal. Lombroso's physical theory and Goring's theory of the born criminal are subjected to careful inquiry by the author and found unsatisfactory. Crime is really a bio-social problem—it cannot be accounted for by theories—its only sure study is by the clinical examination of each individual offender.

The author ingeniously classifies the legion number of crimes into four great groups: Crimes of acquisitiveness, crimes of violence, crimes against morals and other crimes. As so many classifications of insanity have been made, the author wisely adopts for purposes of description a broad basis. He takes well known clinical entities as general paralysis of the insane, alcoholic insanity, senile mental disorders, epilepsy and the like and shows how these may give rise to crimes. Special attention is devoted to the crimes liable to be committed by those suffering from mental deficiency and moral imbecility. He classifies the so-called ill-defined psychoses under three great headings: *Dementia præcox*, manic depressive insanity and delusional insanity. A short description of each disease is given followed by an examination of the way in which that disease may lead to crime. His remarks are profusely illustrated by detailed clinical accounts of patients under his care. He suggests that the character of the crime committed depends on the mental condition of the patient. The general paralytic in the prime of his manhood is euphoric and commits crimes of acquisitiveness; the alcoholic is depressed by the diseased condition of his bodily organs and commits crimes of violence, of murder.

Crime presupposes punishment. How "must this punishment be modified or abolished by any morbid mental condition present in the offender?" Criminal responsibility, he suggests, is purely a legal matter. "The law can impute full responsibility to all offenders, whether they be sane or insane." The attitude of English law towards the insane criminal is traced. In 1743 Hale fixed that persons with a mental age of fourteen or under are not responsible in the eyes of the law. In 1843 the famous McNaughten rules were formulated and both these laws form today the basis of all English law in regard to the responsibility of the criminal insane. The McNaughten rules are analysed and found "unsound in principle and faulty and confusing in form." Here is the seat of "the heated and at times acrimonious controversy between the medical and legal views" of this matter. The whole law dealing with the responsibility of the criminally insane must be radically changed. The view "that a man is sufficiently punished by his madness" should be adopted, whilst the duty of the alienist is not to fix the responsibility of the accused, but to say that he is or is not suffering from some form of mental disorder.

The book is boldly, dogmatically written. It furnishes much food for thought and although the author's views will lead to much controversy, he is to be thanked for thus so clearly setting forth both the legal and medical aspects of the criminal insane.

[1] "Crime and Insanity," by W. C. Sullivan, M.D.; 1924. London: Edward Arnold and Company; Demy 8vo., pp. 268. Price: 12s. 6d. net.

### DERMATOLOGY.

Dr. Frederick Gardiner's book entitled "Handbook of Skin Diseases" is an extremely handy little book for the busy practitioner who has not the time to devote to the perusal of large works on dermatology, but wishes to determine rapidly the diagnosis and treatment of a patient's condition.[1] The book is the general outcome of lectures given to students and the author deals more or less fully with the commoner diseases encountered in general practice. The lines of treatment laid down are sound and well up to date. Many useful prescriptions are given. The book is well illustrated, it contains forty-six illustrations and twelve coloured plates. The print is good and clear and the book will certainly fill the purpose for which it was written.

[1] "Handbook of Skin Diseases," by Frederick Gardiner, M.D., B.Sc. (Public Health), F.R.C.S.E., F.R.S.E.; Second Edition; 1924. Edinburgh: E. & S. Livingstone; Crown 8vo., pp. 248, with 46 illustrations in the text and 12 coloured plates. Price: 10s. 6d. net.

The Medical Journal of Australia

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## Public Health Efficiency.

On April 29, 1922, we published an account by Dr. Franklyn Royer of the work which had been undertaken at Halifax and Dartmouth by the Massachusetts-Halifax Health Commission subsequent to the devastating explosion of December, 1917, in Halifax Harbour. Twelve months later Dr. Royer was good enough to send us a progress report of the work and last week we published a third article by him giving further details of the results which have been achieved. The record is one of considerable importance and many lessons may be learned from it, lessons which are not only applicable to public health conditions generally, but may be of assistance in the elucidation of problems encountered in the Commonwealth of Australia.

The work of the Massachusetts-Halifax Health Commission was rendered possible by the generosity of the people of Massachusetts. A large sum of money was subscribed for early relief work and when the Dominion Government took over the organization of relief a sum of approximately a quarter of a million dollars was found not to be needed for the purpose for which it had been subscribed. The determination of how this money was to be spent was left in the hands of Dr. Victor G. Heiser, Director of the East for the International Health Board of the Rockefeller Foundation. He recommended that the money should be utilized in an endeavour to improve health conditions in Halifax and Dartmouth. The scheme elaborated by him necessitated the appointment of an executive officer and public health nurses, a public health educational campaign, the treatment and supervision of milk and water supplies and modern sanitation. The undertaking was thoroughly well organized and coordinated by a central body consisting of nine commissioners and an executive staff. Its activities were far-reaching and embraced almost every branch of hygiene. It is not surprising that success should crown the efforts of the Commission. The work was waiting to be done and it is probably correct to state that never before in the history of hygiene had a competent body of men, free from the red tape of official half-heartedness, been entrusted with sufficient money to pursue their ideals. Medical men in charge of health departments are usually compelled to curtail their efforts by the financial stringency placed on them by short-sighted politicians. Health reforms are not immediately productive of tangible results and are thus regarded as of secondary importance. Dr. Royer shows that the results of the health programme undertaken by the Massachusetts-Halifax Commission have been remarkable. If three hundred and sixty-five lives can be saved annually in a population of seventy thousand persons, the application of similar intensive measures in a continent like Australia would in a decade effect a saving to the Commonwealth of upwards of a quarter of a million people. That there was an outbreak of infantile diarrhœa in 1923 in Halifax which to some extent spoiled the record for that period, merely goes to prove his case. Dr. Royer states that apparently no official investigation was undertaken to determine the cause of the outbreak. He points out that infantile diarrhœa is a preventible disease and that the outbreak was probably due to the failure of some of the official agencies to carry out efficient preventive measures. That regression should occur in the absence of adequate control is but to be expected.

For the successful realization of any scheme of health control several things are necessary. The *desiderata* may be summed up in a few words. They include knowledge, vision, ingenuity, courage and energy, not only on the part of the heads of departments, but also of the rank and file and of the laity who guard the purse strings. It is true that many of the forms of activity used at Halifax and Dartmouth are employed in the several States of the Commonwealth. While we must be thankful for such satisfactory measures as are in use, it must be admitted that in the first place lack of uniform control and in the second place divergence of methods are obstacles which must be removed before satisfactory progress can be made. It is not

intended in this place to enter into a discussion on the coordination of the health services of the Commonwealth, on the necessity for unity of control or even to discuss the question of uniformity of method in the present disjointed state of health adminstration. Much could be written on the value of the public health teaching that was carried into the homes of the people by the officers of the Massachusetts-Halifax Commission and on the education of children in the principles of hygiene. That must be dealt with on another occasion. Our object is to reiterate Dr. Royer's conclusion that however well satisfied a community, however bound down by tradition and however slow it may be to make a change, sickness rate and death rate may by intensive public health education work be brought to a very low level. "Public health is purchasable and within certain limits each community may determine its own death rate."

## Current Comment.

### THE SURGICAL TREATMENT OF DISEASES OF THE STOMACH.

The treatment of such conditions as ulcer of the stomach may be undertaken from one of two points of view. Medical treatment is based on the interpretation of the bio-chemical processes concerned in digestion. Surgical treatment is concerned mainly with the physical aspect. Bolton's researches showed that for the production of gastric ulceration it was necessary to have damage to the mucous membrane and a certain excess of free acid in the gastric contents. The damage to the gastric mucosa is the result of the action of the proteolytic enzyme on the cells of the mucosa and this has been rendered possible by the disturbance of the hormonic action of the various glands. The disordered action of the latter is probably occasioned by local stasis in the mucosa. The object to be attained by medical treatment consists in the reduction of the proteolytic action by rest to the affected area and the use of certain alkaline drugs. In surgical treatment either the lesion is entirely removed or the mutilation is not so extensive and a short-circuiting method is adopted. It will be admitted at once that excision of the ulcer does not remove the cause that has operated in its production, and hence is no guarantee that fresh ulcers will not form. At the same time it eliminates a possible site for the subsequent occurrence of malignant disease.

The surgical treatment of disease of the stomach was the subject of an address delivered by Mr. James Sherren[1] before the Surgical Section of the Royal Academy of Medicine in Ireland. Mr. Sherren began with a statement which is important enough in itself, but which made by him before such an audience assumes an added significance. He said that surgery of chronic ulcer of the stomach was in a transitional state and it was necessary to resort still to operative measures which were either mutilating, physiologically unsound or both. Surgery would remain in this condition until a more exact knowledge of the cause of the disease was obtained. It was a reproach that lesions which should be capable of curative treatment by simple means, were allowed to progress until direct interference with the stomach was required to restore the patient to health. At the same time he did not regard the results of surgical treatment as unsatisfactory. On the contrary he claimed that they were excellent and in chronic ulcer far exceeded those obtained by any form of medical treatment.

Mr. Sherren naturally looks at the subject from a surgeon's point of view and the statements which he makes are full of interest. He holds that many abdominal emergencies are preventible. Only six among two hundred and eighteen patients treated at the London Hospital for duodenal ulcer gave no history of previous indigestion. Similar figures were obtained in regard to perforated gastric ulcer and hæmorrhage due to chronic ulcer. Mr. Sherren's definition of a chronic ulcer is one that can be seen, felt and demonstrated to others. He also regards a patient as cured when he has been entirely free from symptoms for a period of two years after operation. Up to January 1, 1924, he had treated by operation seven hundred and sixty-eight patients with chronic duodenal ulcer. Included in this number were seventy-eight operated on for hæmorrhage. Fifteen in the whole series died and five of this number had been operated on for hæmorrhage. Five hundred operated on before January, 1922, were traced and four hundred and sixty-three had remained perfectly well. Prior to January, 1924, six hundred patients with chronic gastric ulcer had been submitted to operation. Twenty-eight of them had died. Of those operated on prior to January, 1922, four hundred and three were traced and of this number three hundred and eleven had remained perfectly well. Of the nine hundred and three who were traced for more than two years after operation, seven hundred and seventy-four had remained well and twenty-nine had become affected by secondary ulceration. Mr. Sherren does not give much detail of the methods used by him and so does not state whether his treatment is confined to surgical interference or whether he also, as so many surgeons rightly do, uses medical treatment as well. It is very likely, however, that he does do so, for in discussing secondary ulceration he states that he is a whole-hearted believer in the physiological or, as he prefers to call it, the chemical action of gastro-enterostomy as opposed to the purely mechanical.

Mr. Sherren discusses acute ulcers of the stomach. Acute ulcers are often small. They cannot be seen on external examination of the stomach and often not when the mucous membrane

[1] *The Lancet*, March 8, 1924.

is inspected during life, but he has not failed to find ulceration in the stomach of a patient who has died from hæmatemesis with this type of symptoms. Mr. Sherren has operated on sixty-three patients for hæmatemesis presumably due to acute ulceration. Three of the patients died. In every instance the stomach had been inspected and explored at the operation and nothing found and in all acute ulcers were demonstrated *post mortem*. He is very definite in the statement that patients with acute ulceration and hæmatemesis should not be operated on. The acute ulcer cannot be dealt with directly, gastro-jejunostomy cannot check the bleeding and adds enormously to the mortality. When the bleeding has ceased, a diagnosis should be made and if the condition is regarded as one of acute ulceration, careful search should be made for septic foci in the mouth, nose, ears and so forth and these should be treated. If no exciting cause is discovered, the question of abdominal operation should be considered. Mr. Sherren is of opinion that this is the safest procedure and is calculated to prevent the formation of further acute ulcers. Among the sixty-three patients explored were twenty-nine in whom disease of the appendix was present. In twenty-seven no further hæmorrhage took place.

A type of ulcer to which Mr. Sherren draws attention, is the recurrent acute ulcer. It is seen most frequently in women suffering from gastric ptosis and is associated with hæmatemesis. In discussing the relationship between acute ulcer, relapsing ulcer and solitary chronic ulcer which is so common in men, Mr. Sherren points out that the acidity of the gastric contents is greater in men than in women. In women the lower gastric acidity allows healing of the ulcer and the scar tissue so formed gives rise to hour-glass contraction. In true chronic ulcer healing does not take place between attacks. This is evidenced by the occurrence of acute perforation or hæmorrhage when the patient is apparently well. Hour-glass contraction of the stomach is known to be more common in women than in men. Mr. Sherren has operated on one hundred and nineteen patients with hour-glass contraction. Twelve of these were men. In only four was carcinoma found and these patients were women.

In discussing secondary ulceration Mr. Sherren points out that damage to the mucous membrane of the jejunum may be brought about by infection not treated at the time of operation, by the use of unabsorbable suture material or by bruising from clamps. He holds that if the operation permanently abolishes free hydrochloric acid in the gastric juice, chronic ulceration does not occur. He also regards increased gastric acidity as the most important factor in the development of secondary ulcers and maintains that a large opening removed from the pylorus produces the greatest lowering of gastric acidity.

Mr. Sherren's contribution is interesting. His figures are arresting. He writes as a surgical enthusiast who recognizes the limitations of his art, and above all he lays emphasis on the important question of prevention.

## VENOUS PRESSURE.

Although a wide clinical experience and a discerning mind are the most important requisites for accurate diagnosis and the successful treatment of disease, laboratory aids and clinical instruments of precision are indispensable to the modern physician. Estimation of the venous pressure is a matter that has not received adequate attention.

In 1915 Clark investigated the question of venous pressure in relation to cardiac decompensation. As a result of the examination of fourteen patients he came to the conclusion that the readings were of importance from the prognostic point of view. The subject has been recently investigated by Dr. J. A. E. Eyster and Dr. W. S. Middleton.[1] In the first place they endeavoured to determine the normal venous pressure in man. They used the instrument described by Hooker and Eyster and used a box covered with rubber dam and applied to the skin by the aid of glycerine. They refer to the findings of Hooker and Eyster that a diurnal variation exists, the pressure tending to rise during the day and reaching its lowest level before the individual under observation gets out of bed in the morning. The range of pressures was large.

Drs. Eyster and Middleton estimated the venous pressure of twenty-three normal persons at rest in bed. In no instance did they obtain a reading higher than eleven centimetres of water. The lowest individual reading was two centimetres. They state that the reading obtained is quite independent of age, but that older persons after ordinary exertion and in the erect or sitting posture may have a relatively high pressure. They next investigated the variations of venous pressure in cardiac decompensation. They claim that their findings have substantiated the conclusions of Hooker and Eyster and of Clark that the peripheral venous pressure rises to an abnormal level in cardiac decompensation, that the degree of rise is approximately proportionate to the degree of clinical heart failure and that such determinations are of value in prognosis and treatment. They also confirmed the statement of Clark, that the output of urine in relation to the fluid intake varies approximately in an inverse ratio to the venous pressure. If venous pressure determinations are made often enough, it is usually found that an alteration in pressure precedes the change in urinary output. They investigated the relationship between venous pressure and cardiac size with the aid of radioscopy. They found that as the decompensated heart regained compensation, there was a tendency towards reduction in its size. This reduction was approximately parallel to the falling venous pressure. They also made venous pressure observations on eight patients suffering from lobar pneumonia. In two patients periods of cardiac failure were associated with abnormally high venous pressure. They hold that routine determinations of venous pressure in both cardiac decompensation and pneumonia offer most valuable aid in following the course of the condition and as a guide to rational therapy.

[1] *Archives of Internal Medicine*, August 15, 1924.

# Abstracts from Current Medical Literature.

## PÆDIATRICS.

### Sequelæ of Epidemic Encephalitis.

R. L. J. KENNEDY (*American Journal of Diseases of Children*, August, 1924) discusses the prognosis of the sequelæ of epidemic encephalitis in children. From 1913 to 1924 fifty-nine children were under observation suffering from sequelæ of this disease. Twenty of the children presented the respiratory syndrome. During or some time after the acute illness the patient begins to breathe abnormally. Usually the respirations consist of a period of hyperpnœa lasting for a few seconds or a minute. This is followed by a period of apnœa or perhaps more properly breath-holding. The hyperpnœa may be quiet, but is usually of a noisy, puffing character. Most of the children displayed various forms of hyper-activity during the attacks. This hyper-activity varied from slight twitching of the fingers to definite changes of posture and action. The disturbances do not occur during sleep. The author gives the history of several of these children. The condition does not seem to be so hopeless as some of the other sequelæ, as there is no apparent deteriorating effect. The severity of the respiratory syndrome is apparently limited and does not progress beyond a certain degree. Having reached this, it tends to remain stationary or to improve. There were twenty-one instances of the Parkinsonian syndrome. The outlook in this condition is bad. Beginning insidiously with tremor, awkwardness, mask-like expression or one of the other features of the disease, it progresses until fully developed. In spite of the physical impairment and slow reaction time, it has been noted that there is very little effect on the mentality. There is little or no hope of recovery to anything approaching a normal condition, although the immediate danger to life is not great. One of the most troublesome and most common of the sequelæ is the disturbance of sleep and the heightened psycho-motor activity which accompanies it. The hours of sleep are often reversed. There were nineteen patients in this series who manifested this condition. The inversion of the time of sleep, a decrease of the total sleeping time and the nocturnal activity are the chief features. In the children with sleep disturbance and without other symptoms improvement has been of a general nature, so that of all groups these children seem to have the least permanent impairment. Very few patients who recover from an acute attack of epidemic encephalitis, fail to show some effects of the illness for a long time. Change in personality and behaviour may be considerable. There is no evidence to show that these patients are mentally retarded or deficient. They are moral rather than mental imbeciles. Of the twenty-six children in this series who manifested this syndrome, the mentality of twenty was so impaired that they made little or no progress and some of them became worse. The remaining six were children attending school and making moderate progress. Besides the syndromes discussed other manifestations were displayed by a group of six children who suffered from the acute illness before the age of four years. In these the sequelæ were most severe. One child was well. Five were mentally deficient. One was deaf, dumb and blind. The disease fortunately affected the younger children in only a small number of instances, but in this series the effects in all except one were severe and the prognosis was uniformly bad.

### Infantile Splenic Anæmia.

G. W. ST. C. RAMSAY (*The British Journal of Diseases of Children*, January—March, 1924) discusses infantile splenic anæmia with a view to determining whether it should be regarded as a disease *sui generis* or as a form of secondary anæmia. He follows Poynton, Thursfield and Paterson in summarizing the clinical features of this condition as follows: Infantile splenic anæmia does not develope after the fourth year of life; anæmia is present along with degenerate and embryonic red cells; myelocytes are present in the peripheral blood and the spleen is enlarged. The author emphasizes the importance of remembering that at this period of life the hæmopoietic tissues present great differences from those observed in later life. The hæmoglobin in normal children under four years of age is 70%. The average total white cell count varies between 15,000 at six months and 8,500 at the third year. For the first eighteen months the average ratio of lymphocytes to polymorpho-nuclear leucocytes is two to one. The absolute number of lymphocytes from this time to the sixth year gradually falls, while the number of polymorpho-nuclear cells remains very constant. By the third year the numbers of lymphocytes and polymorpho-nuclear cells are approximately equal. On analysing one hundred and twenty cases of anæmia in children under four years of age, twenty-seven were found to be characterized by all the features which are considered essential to justify a diagnosis of infantile splenic anæmia. Amongst these were instances of tuberculosis, pneumonia, syphilis and other infections. In twenty-two of these patients rickets was present. In twelve instances the blood picture was complete except for the presence of myelocytes. The spleen was enlarged in all. Syphilis was present in three of these and lead poisoning in one. Rickets was absent in only three. The author has observed that myelocytes may be present in small numbers at one examination and not found even after prolonged search at another. In a third group the blood picture was complete, but there was no enlargement of the spleen. He suggests that the sequence of events is as follows: Simple anæmia, anæmia *plus* myelocytes, enlarged spleen *plus* anæmia and anæmia *plus* myelocytes *plus* enlarged spleen. His conclusion is that infantile splenic anæmia is not a disease *sui generis*, but a form of simple secondary anæmia.

### Congenital Obstruction of the Duodenum.

A. B. MARFAN, TURQUETY AND J. DEBRAY (*Le Nourrisson*, March, 1924) report a case of congenital obstruction of the duodenum, due to the presence of a tumour which on microscopical examination proved to be an adenoma. At birth the infant appeared healthy and weighed 2,600 grammes. It took the breast rapidly, but vomiting began immediately and continued with periods of amelioration and aggravation. When seen by the authors at the age of four months it weighed 2,750 grammes. Examination of the abdomen revealed permanent ballooning of the epigastric region with gastric peristalsis. No pyloric tumour was felt. The vomiting was projectile, the vomited material contained bile and the constipation was intense. The infant had an umbilical hernia. There was a large ulcer in the region of the umbilicus and an infection of the surrounding skin was present. Radiographic examination revealed dilatation of the stomach and of the duodenum. The surgeon refused to operate on account of the condition of the skin. The infant died three days after admission. On opening the abdomen at autopsy the stomach was seen to be greatly dilated; it communicated with a second somewhat smaller pouch formed by the dilated portion of the duodenum. On palpating the duodenum a distinct thickening of the posterior wall was felt just below the opening of the bile duct. This tumour almost entirely effaced the lumen of the intestine, so that a probe could scarcely be passed through.

### Congenital Syphilis.

LEONARD FINDLAY (*American Journal of Diseases of Children*, August, 1924) discusses the incidence and treatment of congenital syphilis. He considers that the incidence of this disease has been grossly exaggerated in many quarters. Recent research has convinced him that in Glasgow something under 1% of the infant and child population is infected with the *Spirochæta pallida*. The most delicate and reliable test for determining the presence of congenital syphilis is a reaction to the Wassermann test. However a Wassermann reaction in the new born is no proof that the infant is syphilitic. The antibodies or whatever calls forth the Wasermann reaction may pass from the mother to the infant, but it is the spirochæte which causes the disease. Unless spirochætes are present in the infant, the antibodies which emanated from the mother, will be gradually eliminated and the child's serum will fail

to react. The author's experience leads him to the conclusion that neuro-syphilis is an evidence of the existence of an attentuated, rather than of a special neurotropic toxin. Treatment is divided into curative and prophylactic. The author regards the curative treatment as a failure. A cure is obtained in only a minority of instances. The prophylactic treatment is much more successful. Amongst fifty pregnant syphilitic mothers who were treated at the venereal diseases clinic, all except three had living and apparently non-syphilitic children. Anotner result of ante-natal treatment is that many of these women continue to give birth to healthy non-syphilitic children without the institution of another course of treatment. The author concludes that the only hope for the eradication of congenital syphilis lies in prophylaxis.

## ORTHOPÆDIC SURGERY.

### Traumatic Dislocation of the Hip in Childhood.

C. C. CHOYCE (*The British Journal of Surgery*, July, 1924) states that traumatic dislocation of the hip is a rare condition. It is of special interest because in several cases recently reported sequelæ have occurred many months after the primary accident. The author has collected records of fifty-nine instances of this condition and included in this number is one which came under his own notice. Of the fifty-nine affected patients forty-two were males and sixteen were females. In one instance the sex of the patient was not stated. The ages of the patients ranged from eleven months to sixteen years and the average was about seven and a half years. Forty of the dislocations were of the iliac or dorsal type, seven of the obturator type, six of the sciatic and three of the suprapubic type. In three records the type of the dislocation was not stated. His own patient was a boy, aged six years, who fell while carrying a larger boy on his back. Reduction was easily carried out under light anæsthesia. Manipulation under anæsthesia was successful in reducing the dislocation in the instances collected in the literature when it was applied within fourteen days of the date of the accident. The interval between the accident and reduction in those patients whom it was necessary to submit to operation, varied from fourteen days to two and a half years. Various operative measures were adopted. The most satisfactory method of access consisted in the sub-periosteal detachment of muscles from the great trochanter or in detachment and subsequent fixation of the trochanter. In several instances of recent date sequelæ have been reported and the author thinks it probable that similar occurrences took place in those reported earlier. In a patient reported by Elmslie limping began eleven months after reduction and the condition progressed to one of pseudo-coxalgia. In Rehbein's patient definite signs of pseudo-coxalgia became apparent after a lapse of twelve months. Both these observers suggested that the subsequent changes were due to tearing of the *ligamentum teres* and interference with the vessels running in it. These vessels take a more important share in the nourishment of the femoral head in childhood than later when the epiphyseal plate of cartilage between the head and neck is less complete.

### Surgical Treatment of Osteo-Arthritis of the Hip.

C. MAX PAGE (*The British Journal of Surgery*, July, 1924) in the course of the Hunterian Lecture on the surgical treatment of osteo-arthritis discusses the results he has obtained by operative treatment in this disease when it affected the hip joint. The author confines his remarks to the treatment of patients in whom the changes had progressed so far as to be beyond satisfactory relief by medical means. The primary indications for recourse to radical operation in an osteo-arthritic joint are two in number, persistent pain and progressive deformity in relation to the joint affected. Operation should not be undertaken if there is evidence of the presence of a definite infection. The deformity in osteo-arthritis of the hip joint may be atrophic or hypertrophic. The atrophic form is most often seen in women and young adults, the hypertrophic form is commoner in middle-aged and elderly men. A chronic arthritis initiated by a definite bacterial infection will manifest practically the same X-ray appearances as the atrophic type of osteo-arthritis. The choice of operation depends little on the anatomical condition or ætiology, but is determined by the age and general condition of the patient. In the young and middle-aged an effort should be made not only to remove pain, but to provide a stable joint. This can best be done by producing bony ankylosis at the joint line. An arthrodesis can be produced with certainty by a complete erasion of the joint followed by fixation in plaster of Paris. In feeble elderly patients an arthrodesis should not be attempted. For these patients the author has used erasion of the joint, but has made no attempt at subsequent fixation. In this way a painless fibrous ankylosis or pseudo-arthrosis is obtained in a relatively short time. The hip is stable, but there is a tendency to the development of an adduction deformity. Adduction deformity is due to at least two causes. In the first place there is proportionate excessive wasting of the gluteal muscles which lie close to the joints. The adductors which normally exert more control, are situated further from the articulation and do not suffer to the same extent. In the second place the abducting power of the glutei and the *tensor fasciæ femoris* is reduced by the shortening of the neck of the femur. In order to overcome the adducting tendency attention should be paid to the preservation of the function of the glutei muscles and the *tensor fasciæ femoris* and to the preservation of the neck of the femur at as full length as possible. The author refers to Whitman's advocacy of the reimplantation of the bony insertion of the *gluteus medius* and the *gluteus minimus* into the shaft of the femur below the normal position of the great trochanter in order to correct the result of the shortening of the neck of the femur. In describing the technique of the operation on the hip joint the author states that he has used three methods of exposing the joint. The posterior incision necessitates splitting of the *gluteus maximus* muscle. The view is somewhat obscured by the *pyriformis* and the *gemelli* muscles. These may have to be divided. This incision does not give a good field of vision and the author after having employed it in five among thirty-five consecutive operations has abandoned it. The supero-external route necessitates division of the aponeurotic tendon of the *gluteus maximus* muscle and separation of the great trochanter of the femur. This method gives good exposure, does not involve division of vessels of any size and is absolutely conservative in regard to muscle function. The author has employed it in twenty instances and considers it most satisfactory for use in old patients. The supero-anterior route necessitates the division of the *gluteus medius* and the *tensor fasciæ femoris*. The outer border of the ilio-femoral ligament is also divided. This incision gives the fullest exposure of the joint. Division of the ilio-femoral ligament is undesirable if a movable joint results. The intact ligament is of some importance in the maintenance of close bony contact of the raw surfaces after operation. The author has used this method of approach in nine instances, he does not consider it as satisfactory as the supero-external route. He gives details of thirty-four operations on the hip carried out by him. In twenty-eight the lesion occasioning operation was non-articular osteo-arthritis, in one it was poly-articular osteo-arthritis and in five traumatic osteo-arthritis. In twenty-nine instances he performed erasion of the joint. In twenty-three of these after treatment was directed to the production of bony ankylosis and in six he sought to obtain fibrous union. He analyses tthe results obtained in twenty-four patients operated on between 1919 and 1922. Bony ankylosis was obtained in nine, fibrous union in ten and in five the presence of ankylosis was regarded as doubtful. The position of the limb was normal in three instances, adduction was present in nineteen and abduction in two. Pain in the hip was absent in nineteen and slight in five instances. The average functional shortening was 3.75 centimetres (one and a half inches). The functional value was good in thirteen patients, fair in eight and poor in three.

# British Medical Association News.

## MEDICO-POLITICAL.

A MEETING OF THE SOUTH AUSTRALIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at the Lister Hall, Hindmarsh Square, Adelaide, on August 25, 1924, DR. F. STEELE SCOTT, the President, in the chair.

### National Insurance.

After the HONORARY SECRETARY had read the resolution passed at the special general meeting held on May 1, 1924, on national insurance, the PRESIDENT outlined briefly the various points of the letter from the Federal Committee and explained some of them in detail. He said that the time was very opportune as the members of the medical profession were very much before the public eye and the public expected to be guided by advice from the profession. He hoped that members would take the matter seriously.

DR. J. W. YEATMAN proposed:

> That this Branch expresses its willingness to act on the panel under the British Medical Association and the British Medical Association scheme provided that the six cardinal points be accepted and with a seventh point, namely that all unnecessary clerical work be eliminated.

He said that in ordinary lodge work there was very little clerical work and he thought that there would be no need for more than that amount. If the rate was to be a *per capita* one, there would be no return and no question from the Government. In England every district except two was worked on a *per capita* rate and this was quite satisfactory.

DR. A. R. SOUTHWOOD seconded the motion. He said that he had no objection to the *per capita* rate provided that the payment was adequate. He said that the present lodge rate was very satisfactory and worked well for both doctor and patient. The patient might go to several doctors and the doctor might be charged with making more visits than were necessary and the patient would not have to pay for them.

DR. F. S. HONE asked whether the scheme had been considered by the Federal Committee.

DR. H. S. NEWLAND, C.B.E., D.S.O., replied in the affirmative.

DR. W. T. HAYWARD, C.M.G., drew attention to the fact that according to this scheme more visits than necessary might be paid by the doctor and that the patients could consult numerous doctors for nothing. He suggested that something should be done to check this.

DR. NEWLAND said that the letter from the Federal Committee was only a suggestion. If a man who lived in Port Adelaide, became ill in Norwood, he would call in a Norwood doctor and the doctor would have to attend him. Such a provision did not exist in the English *Act*.

DR. HONE said that if a man's name was not on a list and the man said that it was, the doctor would have to attend him. He also said that Dr. Southwood's objection could be overcome by means of a prescription book.

DR. H. P. BROWNELL said that medical inspectors could check too frequent visiting as was done in England.

DR. HONE asked whether this scheme was the only thing that was being forwarded to the Government from the Federal Committee. The British Medical Association in Australia had promised the Government to assist it in the prevention of disease and in the letter under consideration no mention was made of prevention.

DR. NEWLAND said that the letter only referred to national insurance, the Ministry of Health was dealing with the preventive aspect.

Numerous other members asked questions and discussed the letter.

DR. HONE moved as an amendment:

> That providing that it is found necessary to have national insurance, this Branch agrees to the principles laid down in the letter and that they are preferable to *per capita* payment.

Dr. Hone also said that he would like some preventive clause put in as well.

DR. NEWLAND seconded the amendment. He said that the day of medical charity was disappearing. The hospitals would soon be no longer charitable institutions and under the national insurance scheme there would be no honorary medical officers. Dr. W. J. Mayo had lately said that the poor were well provided for and that the rich provided for themselves. The middle class could not afford to do so and so were very badly looked after.

The amendment was then put to the meeting and carried.

## NOMINATIONS AND ELECTIONS.

THE undermentioned have been nominated for election as members of the New South Wales Branch of the British Medical Association:

DOYLE, ANDREW ALOYSIUS, L.R.C.S., 1884 (Ireland), L.K.Q.C.P., 1885 (Ireland), F.R.C.S., 1899 (Ireland), 201, Macquarie Street, Sydney.

HARRIS RICHARD GUY SEPTIMUS, M.B., Ch.M., 1923 (Univ. Sydney), South Sydney Women's Hospital, Newtown.

MAGEE, LINDA, M.B., Ch.M., 1924 (Univ. Sydney), Bishop's Avenue, Randwick.

# Medical Societies.

## THE MEDICAL SCIENCES CLUB OF SOUTH AUSTRALIA.

A MEETING OF THE MEDICAL SCIENCES CLUB OF SOUTH AUSTRALIA was held at the University of Adelaide on August 1, 1924.

### Mosaic Disease of Plants.

Attention was called by PROFESSOR J. B. CLELAND to the review in the issue of *Nature*, of June 7, 1924, of a publication in the *Annals of the Missouri Botanical Garden*, dealing with the virus of the mosaic diseases of plants. The authors, Duggar and Armstrong, had shown that the size of the particles necessary to produce infection of the tobacco with mosaic virus, was approximately that of the particles in a fresh 1% hæmoglobin solution. From this they inferred that the particles were approximately 30 $\mu\mu$ in diameter. Professor Cleland raised the question as to whether a particle of this size could be supposed to contain a sufficient number and variety of molecules to constitute a living organism.

PROFESSOR T. BRAILSFORD ROBERTSON pointed out that Duggar and Armstrong relied upon filtration through ultra filters as the basis of their estimate of the size of the infective particles. This method of estimating the size of particles was open to criticism of two kinds. In the first place it could not be definitely established that filtrability was merely a question of size of the particle which passed through the filter. It might also involve its affinity with water or with the substance composing the filter itself. Thus a small particle with a large galaxy of associated water molecules might not be able to pass through the filter, while a larger particle not similarly associated with water might pass through the filter with comparative ease. In the second place, the particle might be deformed under pressure and temporarily elongated in an axis vertical to the pores of the filter, permitting by this temporary deformation passage of a body initially much larger than the openings in the filter. Even if they neglected these possibilities, however, and assumed that the results quoted did actually prove that the infective particle in the mosaic disease of tobacco was not more than 30 $\mu\mu$ in its least diameter, this was about one hundred times the diameter of a molecule of carbon dioxide according to the estimations of Nernst. In estimating the molecular volume of a protein they must necessarily make certain assumptions regarding the structure of the molecule, particularly in regard to the mode of union of the oxygen

atoms. Taking the estimation which would yield the least volume and that which would yield the largest, the true volume must lie somewhere between these measurements. In this way they might estimate that the volume of the casein molecule must be about five hundred and twenty-three times that of a molecule of carbon dioxide. The diameter of the molecule could, therefore, be about eight times the diameter of a molecule of carbon dioxide. The diameter of the infective particle in mosaic disease, therefore, would be sufficient to permit about twelve molecules of casein to be assembled in a row, provided they were so closely compacted as to be in physical contact with one another. Recollecting that the results cited conveyed no information as to the magnitude of the longer diameter of the infective particle, it would be evident that there was room within a particle of the size mentioned for a very considerable number and variety of molecules, even of molecules as bulky as those of a protein. The possibility must always be admitted, however, that a self-perpetuating type of chemical compound might some day be found to exist and if such a chemical compound were found, he did not know of any way in which it could be properly distinguished from a living organism. They were accustomed to think of life as associated with certain structures, but that might not be essential and so far as he could see, the most essential feature of life was its capacity to propagate itself. A chemical compound having this capacity would already partake to this extent of the character of a living organism. The measurements of Duggar and Armstrong, however, did not yet establish this possibility.

### Reproduction of Infusoria.

Professor Robertson also described experiments demonstrating the mutually accelerative effect of contiguous individuals upon the rate of reproduction of two species of Infusoria, namely *Enchelys* and *Colpidium*. It had been stated by Cutler and Crump that they had been unable to obtain any evidence of such mutual acceleration of development in cultures of *Colpidium* in synthetic medium. The experiments had now been repeated with both *Enchelys* and *Colpidium* in the synthetic medium employed by Cutler and Crump and allelo-catalytic effect had readily been observed. A further examination of Cutler and Crump's technique showed that their failure to obtain the effect was due to the omission of the precaution of washing the organisms free from the old culture medium before isolating them. Since the old culture medium contained an accelerative agent derived from many thousands of divisions, the small amount associated with the isolated Infusoria would totally obscure the accelerative effect of the accelerative agent derived from one additional individual.

## THE MELBOURNE PÆDIATRIC SOCIETY.

A meeting of the Melbourne Pædiatric Society was held at the Children's Hospital, Melbourne, on September 10, 1924, Dr. W. Dismore Urjohn, O.B.E., the President, in the chair.

### Mental Disorders in Childhood.

Dr. M. F. H. Gamble read a paper in which he dealt first with amentia. The subjects of amentia included idiots, imbeciles, mental defectives, morons and the feeble-minded. These terms indicated a condition of mental deficiency of varying degree due to arrest of development of the brain from disease of the child *in utero* or occasioned sometimes by cerebral injury or disease occurring at or soon after birth. The great majority of these conditions were congenital and they differed in degree and not in kind. The complete evolution of the brain and its functions might either be hindered, brought to an early standstill or never be developed at all. Consequently an innumerable variety of grades in the congenital mental defect was found.

Clinically idiots might be divided into: (i.) Absolute idiots, those whom it was impossible to educate in the slightest manner, in whom the faculty of attention was absent; (ii.) those idiots whose attention was aroused momentarily by loud sounds or bright lights and who were capable of a certain limited amount of articulation, but who were incapable of being taught in any way; (iii.) idiots whose attention could be obtained, but proved unstable and who could only be taught to a limited extent, chiefly manual labour.

The normal infant showed power of attention from the sixth week onwards in progressive degree, while the idiot and imbecile displayed absence or weakness of that faculty all their lives.

The majority of idiots and imbeciles presented physical stigmata of degeneracy, though he (Dr. Gamble) would substitute the words congenital syphilis for the term degeneracy.

The stigmata of degeneracy at present accepted were as follows: (i.) Anomalies in the shape of the skull with coincident anomalies in the shape of the brain; (ii.) anomalies which showed a tendency on the part of the individual to revert to an ancestral type (atavism); (iii.) deformities which showed evidence of incomplete development.

As to the ætiology of amentia the Wassermann reactions and *post mortem* findings investigated by Dr. Lind at the Kew Asylum showed conclusively that congenital syphilis was by far the most frequent cause of the condition and of its congener *dementia præcox* or delayed imbecility.

Dr. Gamble also quoted statistics from various sources showing the close association between mental deficiency and congenital syphilis. Other factors said to have an influence in the production of mental deficiency were alcoholism in the parents, heredity, neuropathic parentage, epilepsy, ineffectual attempts at abortion and instrumental delivery. With regard to the influence of alcohol in amentia, Dr. Gamble quoted the data gathered by the National Eugenics Laboratory of the London University which were as follows:

(i.) There is a higher death rate among the offspring of alcoholic parents than among the offspring of sober parents.
(ii.) Owing to the greater fertility of alcoholic parents the net family of the sober is hardly larger than the net family of the alcoholic.
(ii.) Parental alcoholism is not the source of mental defect in the offspring.

He did not consider that pre-natal influence (maternal impressions) had any effect in causing amentia and when such an event happened, it could only be regarded as coincidental. Parental insanity, epilepsy and amentia all provided their quota of mental defectives. Inherited syphilis which had a strong tendency to attack the vascular system, might act in two ways, either through morbid intra-uterine changes or by causing meningeal and cerebral lesions during the first year of life.

The principal earliest manifestations of amentia were: (i.) Difficulty in taking the breast or bottle, it seemed each time that the act was a new one for the infant; (ii.) violent, continued and unprovoked crying; (iii.) impossibility of attracting the child's attention or of its fixing its gaze; (iv.) lack of expression in the face.

There were two classes of aments that were true to type, the cretin idiot and the Mongol idiot.

Dr. Gamble then gave a detailed account of these conditions together with case history and *post mortem* findings in a typical one of each.

It was impossible to draw a line of demarcation between the high grade idiot and the low grade imbecile as they merged into one anothter. The imbecile often manifested deficient moral tone. Imbecility was a congenital condition. The ranks of criminality and prostitution were reinforced by these individuals. The moral code had no meaning for them and they allowed their passions unrestrained play. Unfortunately many of them were capable of procreation and when at large they often reproduced their like with rapidity, disastrous to the State. Imbeciles were all distinctly anti-social and must be treated as such by segregation in farm industrial colonies. High grade aments constituted the largest and from the social point of view the most important of all groups of imbecility. They constituted the group to which most sexual perverts

belonged, as did the "pushes" infesting the suburbs of Melbourne. They were defective in judgement, their reasoning power was warped and their self-control was diminished. They might appear fluent in conversation and composed a moderately good letter, but arithmetic and cognate subjects were stumbling blocks to them.

Discussing the pathology of amentia, Dr. Gamble stated that the idiot had a brain so undeveloped and imperfect that the individual was incapable of any intelligence or response to his surroundings other than an instinctive and reflex response of little intensity. There had been a maldevelopment of the nerve elements. In other cases there was under-development of the brain. The structure showed an attempt at reversion to an ancestral type with simplicity of pattern in the convolutions and a deficiency in the structure or architecture of the cortical layers and of the association fibres. As a rule there was no active brain disease to be seen on *post mortem* examination of the idiot and imbecile, but a widespread visceral fibrosis was the invariable finding and a similar morbid process had been operating on the brain leading to the maldevelopment of that organ.

Professor R. J. A. Berry said that he was in absolute agreement with Dr. Gamble and was most gratified to hear that the presentation of the subject from the clinical and pathological point of view was so closely in accord with the neurological basis of mental disorders. He described in detail the conception of the nervous system as being built up of a number of units or neurones, each neuronic arc consisting of a receptor and enector portion and the various units being inter-related by means of what he preferred to call junctional nerve tissue.

Professor Berry then explained a number of well known phenomena on the following basis: In the case of nocturnal emission in a healthy boy impulses were continually being generated from the gradually increasing and developing testis and conveyed to the receptor side of the arc. Finally a stage was reached when they overflowed to the effector side and as a result of the stimulation the normal noctural emission occurred. Further, toothache, *angina pectoris* and Jacksonian epilepsy could be explained in a similar manner. He stated that all phenomena of disease were due to disturbances of the neuronic arc, the abnormal impulses gaining access at the neuro-synapses.

Professor Berry next described the structure of the cerebral cortex which he pictured as being made up of three layers: (i.) Supra-granular layer which included the outer fibre lamina and outer cell lamina; (ii.) granular layer or middle cell lamina; (iii.) infra-granular layer which included the inner fibre lamina and inner cell lamina. The infra-granular layer was concerned with the animal instincts such as the welfare of the individual and propagation of the species. These impulses were more or less controlled by the supra-granular layer which was concerned with all the higher functions of the intellect. The supra-granular was the latest to be developed and the first to go ultimately. It did not develope in the ament who was therefore unable to control the calls made on him from the infra-granular layer.

Insanity could be described as an altered relationship to environment from an abnormal brain construction.

Professor Berry concluded by explaining the method of examining these children clinically and described in detail the investigations necessary for determining the intelligence quotient of a patient.

Dr. John K. Adey spoke of the condition of juvenile general paralysis of the insane. It was a rare disease, but in his opinion the rarity was increased by the fact that it frequently remained undiagnosed even after death. It usually commenced between the ages of ten and fifteen years, but instances in children as young as five years had been reported. It occurred equally in both sexes in contrast to the adult type which was about ten times more frequent in males than in females. Sometimes it occurred in conjunction with congenital deficiency, but frequently the child had appeared to be normal up to the onset of the first symptoms. Occasionally epileptiform or apoplectiform seizes were the first signs of any disease.

The physical signs included a response on the part of the blood and the cerebro-spinal fluid to the Wassermann test. Speech was slurring and the patient was unable to pronounce difficult phrases such as "British Constitution" or "Fifth Field Artillery Brigade," particularly if these occurred towards the end of a sentence. Tremors of the face and tongue were present. Abnormalities of the pupils and eye reactions were found. The pupils were frequently irregular or eccentric and the reactions to light and accommodation were sluggish or absent. The pupils were often unequal and their inequality varied independently and sometimes from day to day. The knee jerks were sometimes exaggerated except in the tabo-paretic variety. Epileptiform or apoplectiform convulsions occurred. The symptoms were those of gradual deterioration of the mental faculties. The child ceased to take interest in school lessons, games or playmates. Grandiose delusions were rarely exhibited. The prognosis was hopeless and death occurred in three to five years.

Dr. H. Boyd Graham concurred with the previous speakers and he strongly urged medical practitioners to take pains to make a careful diagnosis in these conditions. He had found it most satisfactory in general practice as it was of greatest assistance to the parents to have such children suitably placed according to the degree of mental deficiency.

Dr. H. F. Maudsley spoke from the psychological aspect of mental disorders, the theoretical considerations of which fitted in largely with the practical views. Its application was better seen in the higher grades of mental deficiency.

In his schemata of mental evolution Treadgold showed how the higher psychological faculties of the mind were built up on instinctive impulses. These higher faculties were put into three main groups: Learning, wisdom and sentiments. In the higher grades of amentia the absence of any one of these factors might be noted, for example the child with absence of one particular sentiment such as moral feelings, but with every other faculty intact, might be extremely clever and intelligent and yet be a potential criminal. It was difficult to place such as this in terms of maldevelopment of the cortical supra-granular layer.

Mental disorders arising from *encephalitis lethargica* were often characterized by a considerable degree of dementia with very little change in the supra-granular layer. In the Parkinsonian sequelæ of this disease there was in the early stage an apparent dementia which might go on to a true dementia often simulating to some extent *dementia præcox*. The morbid anatomy of this condition had been shown to consist of degenerative vascular changes in the *substantia nigra* with its close connexions with the basal ganglia.

Clinically there was an absence of automatic and expressional movements which gave the impression of a dull and stupid child, though on examination all faculties might be found to be intact. In the later stages a true state of feeble-mindedness might supervene and he suggested it might come about partly because of the incoordination between the voluntary and the involuntary centres.

With regard to epileptiform seizures in children he directed attention to a condition which had been described lately by Adie in London, a condition of frequent attacks simulating *petit mal* which Adie called pyknolepsy. The attacks at the time were indistinguishable from true *petit mal* except that the attacks never manifested any alteration from one another. There was no attendant mental deficiency and they disappeared completely at puberty.

Dr. R. Ellery also emphasized the incidence of congenital syphilis in the mentally deficient children and quoted a series of two hundred of whom 30% yielded a Wassermann reaction. He stated that it was difficult to establish any relation between syphilis and Mongolism and drew attention to the fact that the Mongolian idiot was often the last member of a large family.

Dr. H. Douglas Stephens considered that the lack of interest in these children on the part of the profession was due to the lack of any encouraging results from treatment. He mentioned two patients.

A female, aged six years, had for the previous ten months been having from ten to a hundred *petit mal* seizures per day and had recently taken to destroying the furniture and crockery in her home.

A male, aged thirteen years, had at the age of five years a symmetrical hydrarthrosis of the knees and his

serum had yielded a Wassermann reaction. The child had had a three months' course of anti-syphilitic treatment and although the serum had failed to react to the Wassermann test, was a thief and an inveterate liar.

What, he asked, could be done for children of this type? Dr. Stephens also considered that alcoholism in the parents was a greater factor than was generally appreciated. He regarded epilepsy as a frequent manifestation of the late results of syphilis. The mentality generally deteriorated with the number of seizures. In his opinion one-eighth of all patients became affected during infancy or in early childhood. Convulsions in young children always aroused suspicions. If they were not associated with fever and occurred at intervals without provocation they were almost certainly epileptic and of serious import. With regard to treatment, Dr. Stephens advocated the removal of septic teeth and tonsils. He mentioned several patients with *petit mal* who had improved immediately after removal of such septic foci. He had also seen a number of children whose seizures had ceased after the course of an acute infective disease such as diphtheria or erysipelas.

Dr. R. R. Stawell said that his experience of the *post mortem* findings in mentally deficient children was very similar to that of Dr. Lind at the Kew Cottage. The great majority of specimens exhibited a diffuse visceral fibrosis and the characteristic "felting" of the meninges. He agreed with Dr. Stephens that the lack of interest was due to ineffectiveness of treatment.

With regard to the higher aments who were not certifiable, Dr. Stawell considered it the duty of members of the profession to make themselves capable of giving sound advice in such conditions, particularly with respect to the investigation and disposal of the patients. In the interests of the community they should all be segregated. Dr. Stawell had also seen several patients with pyknolepsy practically cured after the course of an acute infection. He believed that protein shock therapeusis was helpful in some of these conditions, chiefly by reason of the febrile reaction.

Dr. A. P. Derham who was absent through ill-health, forwarded a letter describing the results of the Wassermann test and its relation to mental deficiency as investigated in a large number of children of the Ward of State class at the Neglected Children's Depôt at Royal Park. These showed that there were approximately three times as many syphilitics among the mentally defective as among the unclassified mass of children from which they were selected; that 50% of congenital syphilitics of the Ward of State class were mentally deficient and that 60% of the mentally deficient were syphilitic.

The President, Dr. W. Dismore Upjohn, thanked the visitors for their most instructive presentation of the subject from its various aspects and the meeting closed.

## Correspondence.

### PERI-BRONCHIAL FIBROSIS.

Sir: I had much pleasure in reading Dr. Hislop's article on peri-bronchial fibrosis and the association of nasal infections and tuberculosis. I have for some years been trying to find a case of chronic bronchitis without chronic nasal infection as shows itself by a muco-purulent post-nasal drip and have not succeeded yet, except in such cases as are due to a direct local irritant.

The lymphatic drainage from the nasal sinuses is towards the mediastinal glands. On these being involved, the infection spreads along the peri-bronchial lymphatics, resulting in hilus thickening and infected bronchi. Whether the infection is tuberculous or otherwise in such involvements, the point of entry must be either nose or mouth which can again be reduced to tonsillar or nasal, because incidental infections are not the cause of such conditions, as they must be essentially chronic to produce such lesions.

Chronic nasal infections are far more common than is at present realized and should be looked for most carefully, as unless they are cleared up, there is no hope of giving your patient any permanent relief in such cases. How many of these cases of tubercular peri-bronchial fibrosis are purely and primarily due to the tubercle bacillus and how many are primarily due to nasal infection with tubercle grafted on top is hard to say, but there is no doubt that a primary nasal infection will pave the way for an ingrafting of tubercle bacilli in the infected mediastinal glands. A patient came to me a few days ago with goître. She presented no focal infection whatever, yet she was very ill and looked markedly toxic. She presented some contraction of the left chest, with a slight prolongation of expiration; nothing else. On screening her she showed some hilus thickening of that lung and as I could not get the slightest evidence or history of nasal infection, I had to consider it a case of hilus tuberculosis, the toxæmia of which was causing some thyreoid enlargement and that the symptoms were due to her lung condition. The prognosis is distinctly bad in such cases. I am pleased that Dr. Hislop has made it clear that physical findings in such cases are so negligible, as unless one is on the look-out for such things, they are quite easily overlooked until cough and expectoration are pronounced. I have for long held that where there are signs of toxæmia, if no infective focus can be found, the case must be tubercular or specific in the large majority of cases. The toxicity or otherwise of the symptoms in such cases is a good guide as to whether the condition is active or quiescent, for no information can be had from physical signs.

Comparatively recently much work has been done at Broken Hill regarding miners' phthisis and I would suggest that, in view of the hilus fibrosis which can result from chronic sinus infections alone, all men working below should be examined with to ascertaining if they have chronic nasal infection or not and if such is found, they be given a course of colloidal manganese injections which clears up about 90% of sinusitis cases as long as the antra are not involved. If this were done, the incidence of miners' phthisis might be much reduced.

Yours, etc.,

Sydney Pern, M.R.C.S., L.R.C.P.

Undated.

## Naval and Military.

### APPOINTMENTS.

The undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette* Nos. 62, 64 and 66 of August 28, September 11 and 23, 1924.

Permanent Naval Forces of the Commonwealth (Sea-Going Forces).

*Confirmation in Rank*—Surgeon Lieutenant (on probation) Jack McKenzie Woods, M.B., Ch.M., is confirmed in the rank of Surgeon Lieutenant, with seniority in rank of 3rd August, 1923.

Australian Military Forces.

**First Military District.**

*Australian Army Medical Corps.*

*To be Major*—Captain J. V. J. Duhig, 1st September, 1924.

**Second Military District.**

*Australian Army Medical Corps.*

Captain F. W. A. Ponsford is transferred to the Reserve of Officers, 1st August, 1924.

*To be Captain (provisionally)*—Philip Lawrence Kenneth Addison, 20th August, 1924.

*Reserve of Officers.*

*To be Captain*—Honorary Captain W. Fenwick, M.C., from the Australian Army Medical Corps Reserve, 1st August, 1924. Lieutenant-Colonel S. Jamieson is placed on the Retired List, with permission to retain his rank and wear the prescribed uniform, 5th September, 1924.

NOV 21 1924 Medical Li

*Australian Army Medical Corps Reserve.*

The second notification respecting the appointment as Honorary Captain of Wilmot Fenwick, M.C., which appeared in Executive Minute No. 193/1918, promulgated in *Commonwealth Gazette* No. 36, dated 14th March, 1918, is cancelled.

**Third Military District.**

*Australian Army Medical Corps.*

Captain J. J. Kelly is appointed from the Reserve of Officers, 15th July, 1924. Captain J. C. M. Harper, M.C., is transferred to the Reserve of Officers, 14th July, 1924.

*Australian Army Medical Corps Reserve.*

Honorary Major A. W. Marwood is placed on the Retired List, with permission to retain his rank and wear the prescribed uniform, 6th August, 1924.

**Fourth Military District.**

*Reserve of Officers.*

Captain J. F. Bartley is placed on the Retired List, with permission to retain his rank and wear the prescribed uniform, 30th August, 1924.

**Fifth Military District.**

*Australian Army Medical Corps Reserve.*

Honorary Major H. J. Lotz is retired under the provisions of Australian Military Regulation 152 (1), 1st September, 1924.

Award of the Colonial Auxiliary Forces' Officers' Decoration.

*Australian Army Medical Corps.*

Colonel W. E. Summons, O.B.E.

## REPATRIATION COMMISSION.

The following have been appointed Commissioners under the *Royal Commissions Act 1902-1912* of the Commonwealth:

Dr. C. B. Blackburn, O.B.E. (Chairman), Dr. A. V. M. Anderson, Dr. H. S. Newland, C.B.E., D.S.O., Dr. E. Sandford Jackson, Dr. W. W. Giblin.

The terms of the reference as quoted in *Commonwealth Gazette of Australia* No. 65, of September 18, 1924, are as follows:

> Is the present method of determining whether an ex-soldier's disability is due to or aggravated by war service adequate to decide the origin or the degree to which it is aggravated, and what portion of his present incapacity can be regarded as having resulted from his war service?

## NOTICE OF MEETING.

A meeting of the Section of Psychiatry and Neurology of the Victorian Branch of the British Medical Association will be held at the Walter and Eliza Hall Institute of Research in Pathology and Medicine, Melbourne Hospital, Melbourne, on October 20, 1924, at 8.15 o'clock p.m.

The Reverend John Lawton will read a paper entitled: "Education in the Light of Psychological Research." All medical practitioners are invited to be present.

## Medical Appointments.

Dr. Alfred H. Barrett (B.M.A.) has been appointed Public Vaccinator at Cobden, Victoria.

## Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser," page xviii.

Austin Hospital for Incurables, Heidelberg, Victoria: Honorary Pathologist.

Melbourne Hospital: Medical Vacancies.

## Medical Appointments: Important Notice.

Medical practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, 429, Strand, London, W.C..

| BRANCH. | APPOINTMENTS. |
|---|---|
| New South Wales: Honorary Secretary, 30 - 34, Elizabeth Street, Sydney. | Australian Natives' Association.<br>Ashfield and District Friendly Societies' Dispensary.<br>Balmain United Friendly Societies' Dispensary.<br>Friendly Society Lodges at Casino.<br>Leichhardt and Petersham Dispensary.<br>Manchester Unity Oddfellows' Medical Institute, Elizabeth Street, Sydney.<br>Marrickville United Friendly Societies' Dispensary.<br>North Sydney United Friendly Societies.<br>People's Prudential Benefit Society.<br>Phœnix Mutual Provident Society. |
| Victoria: Honorary Secretary, Medical Society Hall, East Melbourne. | All Institutes or Medical Dispensaries.<br>Australian Prudential Association Proprietary, Limited<br>Mutual National Provident Club.<br>National Provident Association. |
| Queensland: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane. | Brisbane United Friendly Society Institute.<br>Stannary Hills Hospital. |
| South Australia: Honorary Secretary, 12, North Terrace, Adelaide. | Contract Practice Appointments at Renmark.<br>Contract Practice Appointments in South Australia. |
| Western Australia: Honorary Secretary, Saint George's Terrace, Perth. | All Contract Practice Appointments in Western Australia. |
| New Zealand (Wellington Division): Honorary Secretary, Wellington. | Friendly Society Lodges, Wellington, New Zealand. |

## Diary for the Month.

Oct. 14.—New South Wales Branch, B.M.A.: Ethics Committee.
Oct. 15.—Western Australian Branch, B.M.A.: Branch.
Oct. 17.—Eastern Suburbs Medical Association, New South Wales.
Oct. 21.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
Oct. 22.—Victorian Branch, B.M.A.: Council.
Oct. 24.—Queensland Branch, B.M.A.: Council.
Oct. 28.—New South Wales Branch, B.M.A.: Medical Politics Committee; Organization and Science Committee.
Oct. 30.—New South Wales Branch, B.M.A.: Branch.
Oct. 30.—South Australian Branch, B.M.A.: Branch.
Nov. 7.—Queensland Branch, B.M.A.: Branch.
Nov. 11.—New South Wales Branch, B.M.A.: Ethics Committee.
Nov. 12.—Tasmanian Branch, B.M.A.: Branch.
Nov. 12.—Victorian Branch, B.M.A.: Late date of Nomination of Council. Election of Scrutineers.
Nov. 12.—Central Northern Medical Association, New South Wales.
Nov. 12.—Melbourne Pædiatric Society.
Nov. 13.—New South Wales Branch, B.M.A.: Clinical Meeting.
Nov. 13.—Victorian Branch, B.M.A.: Council. Nomination by Victorian Branch of Representative of Group on Council, London.
Nov. 13.—South Australian Branch, B.M.A.: Council.

## Editorial Notices.

Manuscripts forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to The Medical Journal of Australia alone, unless the contrary be stated.

All communications should be addressed to "The Editor," The Medical Journal of Australia, B.M.A. Building, 30-34, Elizabeth Street, Sydney. (Telephone: B. 4635.)

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